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OEM PRODUCTS: MEDIUM VOLTAGE APPLICATIONS

BULLETIN 1502 / 1503 / 857 / 865

Allen-Bradley • Rockwell Software

Rockwell Automation

Important User Information

Because of the variety of uses for the products described in this publication, those responsible for the application and use of this control equipment must satisfy themselves that all necessary steps have been taken to assure that each application and use meets all performance and safety requirements, including any applicable laws, regulations, codes and standards.

The illustrations, charts, sample programs and layout examples shown in this guide are intended solely for purposes of example. Since there are many variables and requirements associated with any particular installation, Rockwell Automation does not assume responsibility or liability (to include intellectual property liability) for actual use based upon the examples shown in this publication.

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Overview

Rockwell Automation has produced quality Medium Voltage products to meet the requirements of all types of industries for well over six decades.

From the original oil-immersed contactor to air break and vacuum contactors, to solid-state controllers such as Smart Motor Controllers and AC Variable Frequency Drives, Rockwell Automation has developed and built a medium voltage product line that satisfies industries who are demanding more safety, less maintenance, longer life and reliability in motor control equipment.

Added to those demands is the need for smaller, more flexible medium voltage products that are more efficient and reduce building and expansion costs.

OEM frames and components leverage the existing family of motor controllers built by Rockwell Automation. They also incorporate some of the most fundamental, high volume components available in our OEM product line for Original Equipment Manufacturers and electrical equipment companies.

Bulletin 1502 vacuum contactors are a comprehensive line of vacuum contactors used as isolating contactors or as bypass contactors. Light weight and maintainability are but two of the features of this fixed-mounted design.

Bulletin 1503F OEM components are a series of medium voltage frame-mounted components designed to mount into new or existing structures or enclosures. These assemblies can also be used to retrofit existing motor controllers. These products are available as a complete OEM frame or sold individually as components.

Bulletin 1503E MV SMC™ Flex OEM kits are a series of solid-state reduced voltage components designed to mount into new or existing structures or enclosures. These assemblies can also be used to retrofit existing motor controllers. These products are available as an OEM frame and components.

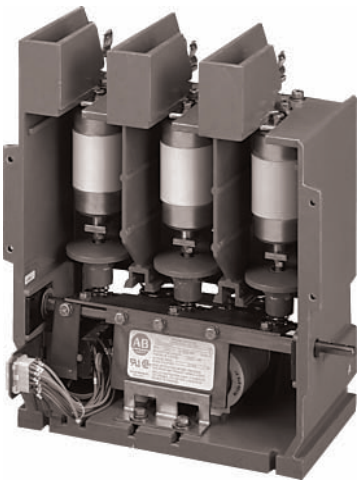
Bulletin 857 is a motor/feeder protection relay that includes all the essential functions needed to protect motors and feeders in diverse industrial applications. The programmable 857 includes the optional arc protection feature, thermal, trip circuit supervision and circuit breaker protection. The device can include numerous communication protocols, as well as a twelve-channel RTD scanner.

Bulletin 865 is a differential protection relay that includes the necessary functions to protect transformers for distribution networks of utilities, industry power plants and offshore applications, as well as motor and generator differential protection. The device's programmable functions include thermal and circuit breaker protection, and numerous communications protocols. An optional arc flash protection is available.

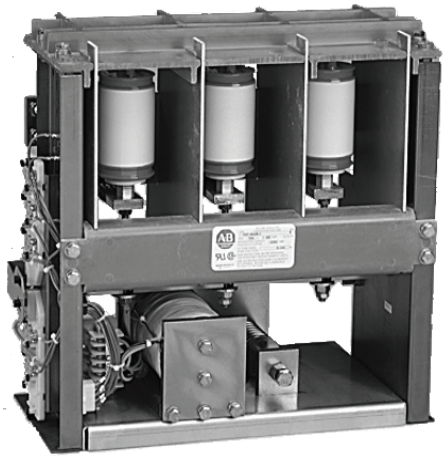
Rockwell Automation also offers standard motor controllers, solid-state reduced voltage starters, and variable speed drives with standard, yet flexible, product configurations for all product lines.

Rockwell Automation offers several OEM programs, such as customer-specific program (custom engineered options and configurations with a standard quick-ship delivery). Contact your local Rockwell Automation office for more information on these programs and other OEM products.

Medium Voltage
400 and 800 A Contactors



400 A



800 A

Description

The Allen-Bradley Medium Voltage 400 and 800 ampere vacuum contactors offer:

- Lightweight, compact design
- High interrupting capability
- Low chopping current
- Visual contact wear indicator
- Field adjustable altitude setting *(800 A only)*
- Provision for mechanical interlocking
- Excellent dielectric recovery allowing for high switching frequency
- Single coil/core magnet assembly *(800 A only)*
- Control power transformer primary fuse holders *(400 A only)*
- Quiet DC coil operation
- Minimal maintenance required
- Mechanical latch design (Optional)
- CSA, CE and IEC Approved
- UL Recognized to 7200 V
- IEC 60470 rated

3-POLE VACUUM CONTACTORS

Specifications

Bulletin 1502 Medium Voltage Contactor Ratings			400 A	800 A
Voltage Ratings ❶				
Maximum Rated Voltage			7200	7200
System Voltages			2400 3300 4160 4800 6600 6900	
Dielectric Voltage Withstand Rating	For 60 seconds (kV)		18.2 / 20 kV (IEC)	
Basic Impulse Level (B.I.L.) Withstand	Phase to Ground, Phase to Phase (kV)		60	60
Current Ratings ❶				
Rated Open Continuous Current			400	800
Maximum Interrupting Current Rating (RMS Sym Amps)	2400 V		6300	12000
	5000 V		6300	12000
	7200 V		6000 ❷	12000
Maximum Interrupting MVA Rating (Sym MVA)	2400 V		25	50
	5000 V		50	100
	7200 V		75 ❷	150
Short-Circuit Withstand at Rated Voltage	Current Peak ½ cycle (kA)		60	85
Short Time Current Rating Capability	For 1 second (kA)		6.0	12.0
	For 30 seconds (kA)		2.4	4.8
Chop Current (Average RMS Amps)			0.5	0.5
Make and Break Capability at Rated Voltage (kA)			4.0	8.0
Contactor Coil Data (Series E)				
Control Voltage (V_{CTL})	Coil Voltage (V_{CL})			
Electro-Mechanical (Relay) Control (Mechanical Latch Only)				
120 VAC	110 VDC	Close Current (A_{DC})	5.6	N/A
		Trip Current (A_{DC})	6.0	N/A
		Pick-up Voltage	102	N/A
		Trip Voltage	84	N/A
IntelliVAC Control (Electrically Held & Mechanical Latch)				
110 to 240 VAC *or* 110 to 250 VDC ❸	VAC : $V_{CL} = \sqrt{2} \times V_{CTL}$ (Max.) VDC : $V_{CL} = V_{CTL}$	Close Current (A_{DC}, 200 milliseconds)	4.3	12
		Hold Current (A_{DC})	0.48	0.7
		Pick-up Voltage ❸	95	95
		Drop-out Voltage ❸	75	75
		Trip Current (A_{DC}, 200 milliseconds)	5.5	5.2
		Trip Voltage ❸	70	70
Contactor Coil Data (Series D) ❽				
Control and Coil Voltage	120 VAC / 110 VDC	Coil Inrush Current (A), Electrically Held	7.3	13.1
		Coil Inrush Current (A), Mechanical Latch	11.5	13.1
		Coil Continuous Current (A)	0.13	0.24
		Coil Pick-up Voltage (VAC)	102	102
		Coil Drop-out Voltage (VAC)	75	75
	230 VAC / 210 VDC	Coil Inrush Current (A), Electrically Held	8.3	10.4
		Coil Inrush Current (A), Mechanical Latch	NA	NA
		Coil Continuous Current (A)	0.11	0.19
		Coil Pick-up Voltage (VAC)	190	190
		Coil Drop-out Voltage (VAC)	140	140

❶ The voltage and current ratings listed are valid up to 1,000 m (3,300 feet).
Please refer to the Altitude Derating Chart on page 7 for ratings above this altitude.

❷ The IEC rating at 7200 V (RMS Sym.) is 5300 Amps / 66 MVA.

❸ Control voltage, as measured at the input of the IntelliVAC control module (when Series E data entered)

❹ A contactor drop-out delay may be configured with the IntelliVAC control module (refer to publication 1503-UM052_-EN-P).

❺ The full altitude range is available with the IntelliVAC control module only, and the IntelliVAC is to be configured accordingly (refer to publication 1503-UM052_-EN-P). The standard mechanical latch contactors, if used with electro-mechanical control, are designed for -1000 to 1000 meters (-3300 to 3300 feet). Higher altitudes are possible by changing the contactor return spring.

❻ Altitude adjustment (manual) is required to support full altitude range.

❼ The number of contactor auxiliary contacts depends on the contactor type. Some of the contactors are used in the typical control schemes used.

❽ Series D contactors are suitable for electro-mechanical (relay) control only.

Bulletin 1502 Medium Voltage Contactor Ratings		400 A	800 A
Operational Characteristics			
Mechanical Life (Operations) x 1000	Electrically Held	2500	250
	Mechanical Latch	100	100
Electrical Life (Operations) x 1000		1000	250
Switching Frequency (Operations per hour)	Electrically Held	600	600
	Mechanical Latch	150	150
Opening and Closing Times (Series E)			
Electro-Mechanical (Relay) Control (Mechanical Latch Only)			
Maximum Closing Time (120 VAC)	50 or 60 Hz (milliseconds)	160	200
Maximum Opening Time (120 VAC)	50 or 60 Hz (milliseconds)	50	60 FDO / 240 NDO ❾
IntelliVAC Control (Electrically Held & Mechanical Latch)			
Maximum Closing Time	50/60 Hz or DC (milliseconds)	100 / 70	150
Maximum Opening Time – without delay ❹	50/60 Hz or DC (milliseconds)	60	60
Opening and Closing Times (Series D) ❽			
Maximum Closing Time	50 or 60 Hz (msec)	160	200
Maximum Opening Time (Normal Drop Out)	50 or 60 Hz (msec)	130	240
Maximum Opening Time (Fast Drop Out)	50 or 60 Hz (msec)	50	60
Capacitor Switching			
System Voltage	2400 V	800 KVAR	2000 KVAR
	4160 V	1400 KVAR	3000 KVAR
	6900 V	2000 KVAR	4000 KVAR
General			
Standard Altitude Rating		-1000 to 5000 meters (-3300 to 16500 ft.) ❺	-1000 to 5000 meters (-3300 to 16500 ft.) ❻
Contactor Weight		21.8 kg (48 lbs)	45 kg (100 lbs)
Auxiliary Contact Rating		A600	A600
Auxiliairy Contacts on the Vacuum Contactor		2 N.O. / 2 N.C.	2 N.O. / 2 N.C.

❶ The voltage and current ratings listed are valid up to 1,000 m (3,300 feet).
Please refer to the Altitude Derating Chart on page 7 for ratings above this altitude.

❷ The IEC rating at 7200 V (RMS Sym.) is 5300 Amps / 66 MVA.

❸ Control voltage, as measured at the input of the IntelliVAC control module (when Series E data entered)

❹ A contactor drop-out delay may be configured with the IntelliVAC control module (refer to publication 1503-UM051_-EN-P).

❺ The full altitude range is available with the IntelliVAC control module only, and the IntelliVAC is to be configured accordingly (refer to publication 1503-UM051_-EN-P). The standard mechanical latch contactors, if used with electro-mechanical control, are designed for -1000 to 1000 meters (-3300 to 3300 feet). Higher altitudes are possible by changing the contactor return spring.

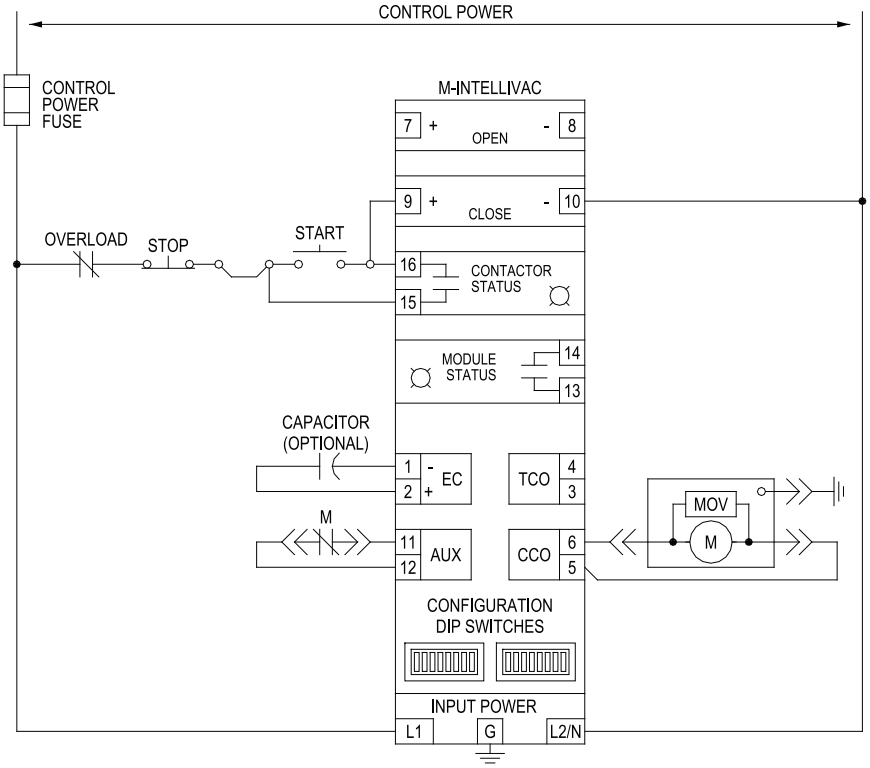
❻ Altitude adjustment (manual) is required to support full altitude range.

❼ The number of contactor auxiliary contacts depends on the contactor type. Some of the contactors are used in the typical control schemes used.

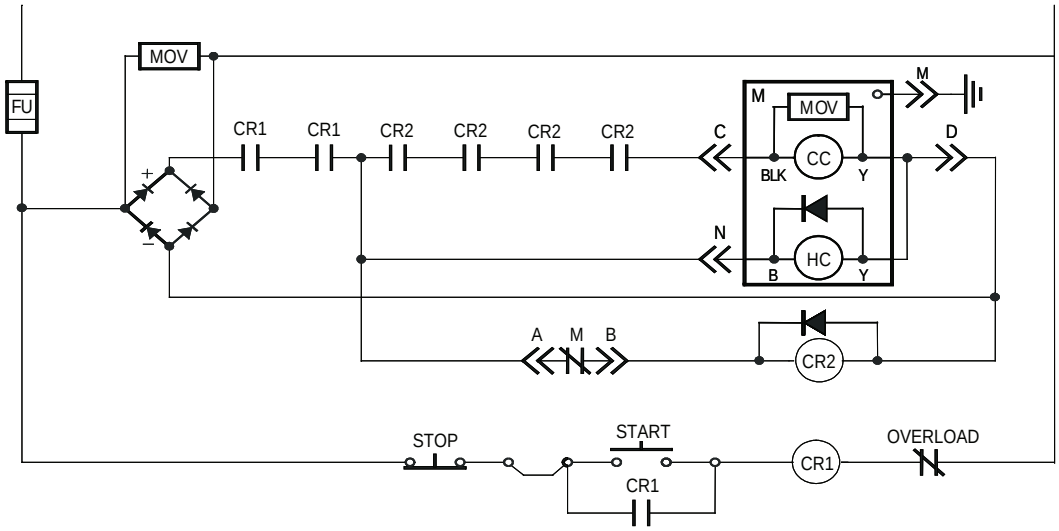
❽ Series D contactors are suitable for electro-mechanical (relay) control only.

❾ FDO = Fast Drop Out, NDO = Normal Drop Out

Typical IntelliVAC Control Circuit (400A, Electrically Held)



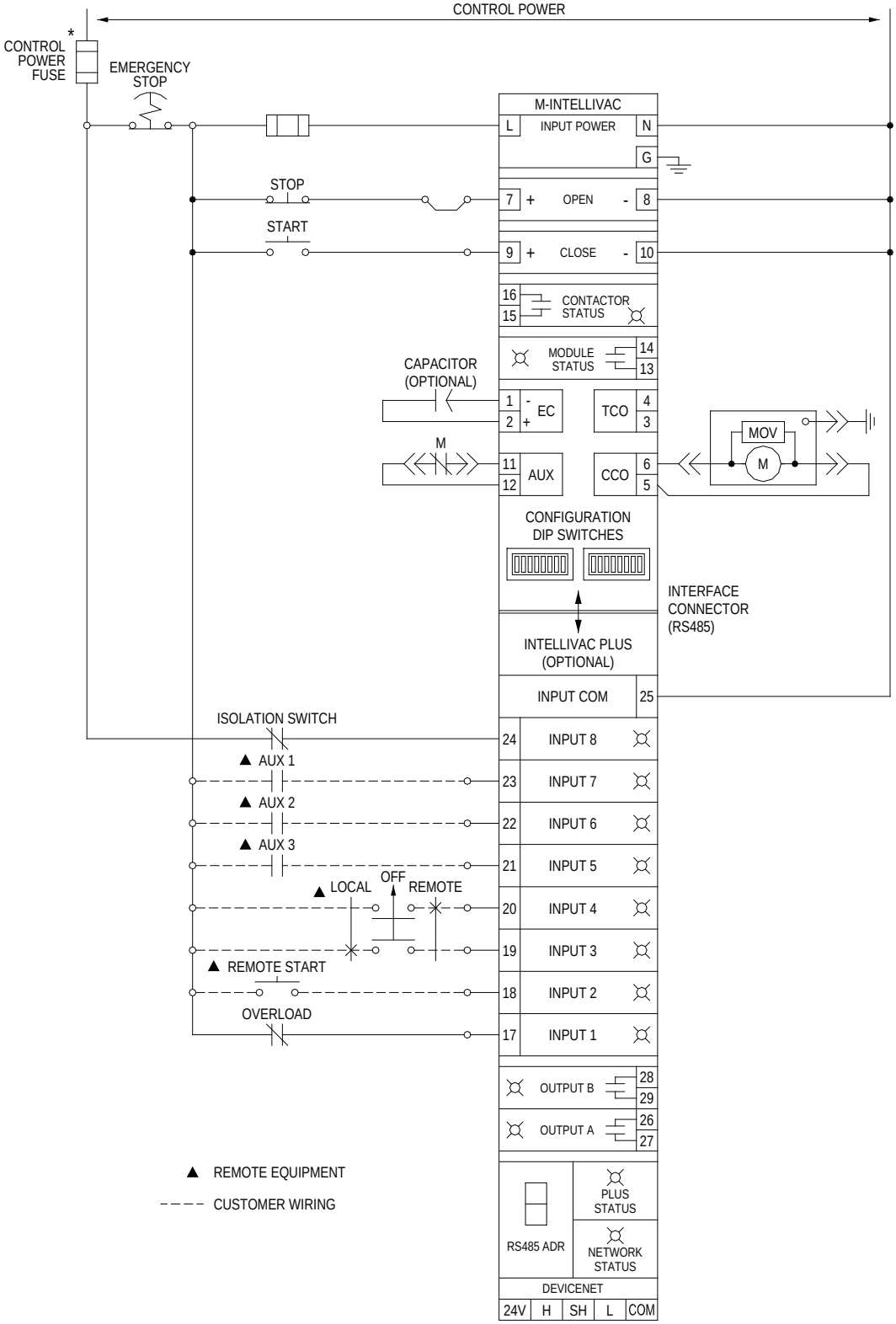
Typical Electromechanical Control Circuit (400A, Electrically Held)



M – MV Vacuum Contactor
CR1 – Control Relay
CR2 – Economizing Relay
CC – Closing Coil
HC – Holding Coil

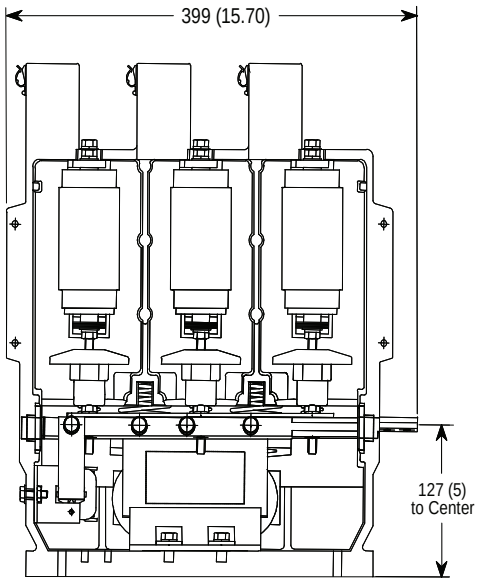
Note: Some of the control circuit devices shown in addition to "M" (MV vacuum contactor) are available as optional equipment. (See Control Panel Specifications on pages 14 and 24.)

Typical IntelliVAC Plus Control Circuit (400A, Electrically Held)

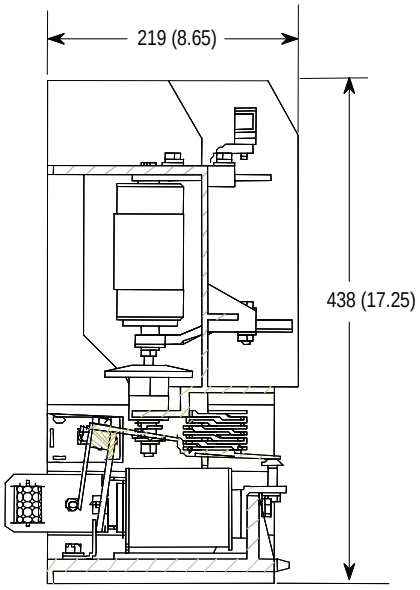


Dimension Drawings

400 A Vacuum Contactor:

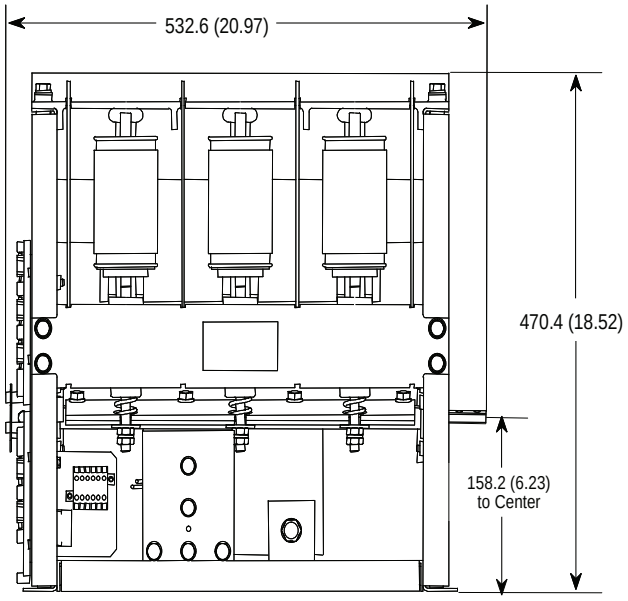


Front View

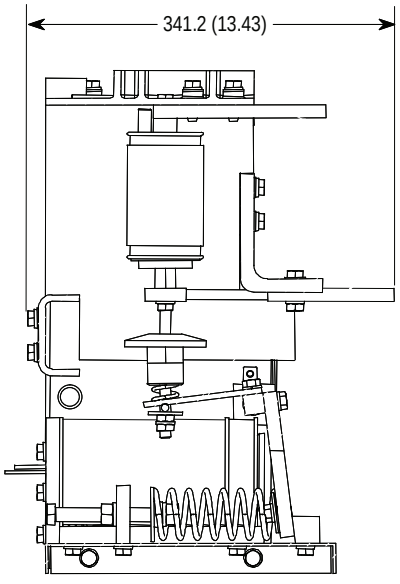


Side View

800 A Vacuum Contactor:



Front View



Side View

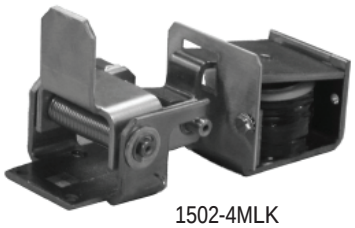
Approximate dimensions in millimeters (inches)

Bulletin 1502 Vacuum Contactors

Contactor Current Rating ❶	Control Circuit	Contactor Description	Catalog Number	Wire Harness Catalog Number ❽
400 Amp ❸	Electromechanical	Fixed Mounted, Electrically Held ❷ ❹	1502-V4DBDA-__	1503-WHE4D
		Fixed Mounted, Electrically Held (fast drop-out) ❷ ❹ ❺	1502-V4DBDD-__	
		Fixed Mounted, Mechanical Latch ❷	1502-VC4DBDB-__	1503-WHM4D
	IntelliVAC™ ❽ *or* IntelliVAC Plus ❾	Fixed Mounted, Electrically Held ❺ ❻ ❼	1502-VC4DBDA-0	1503-WHE4V
		Fixed Mounted, Mechanical Latch	1502-VC4DBDB-0	1503-WHM4V
800 Amp	Electromechanical	Fixed Mounted, Electrically Held ❷ ❹ ❺	1502-V8DXDA-__	1503-WHE8D
		Fixed Mounted, Electrically Held (fast drop-out) ❷ ❹ ❺	1502-V8DXDD-__	
		Fixed Mounted, Mechanical Latch ❷	1502-V8DXDB-__	1503-WHM8D
	IntelliVAC™ ❽ *or* IntelliVAC Plus ❾	Fixed Mounted, Electrically Held ❼	1502-VC8DXDA-__	1503-WHE8V
		Fixed Mounted, Mechanical Latch	1502-VC8DXDB-__	1503-WHM8V

❶ See Appendix A for Full Load Current table.
❷ Complete the contactor catalog numbers by selecting the altitude rating from Appendix B, e.g. 1502-V4DBDA-2. This altitude code is valid for electrically held and mechanical latch contactors (when used with IntelliVAC™ Plus). If a mechanical latch contactor is to be used with electromechanical control, then altitude code 1 through 5 must be selected. These contactors may only be used with electromechanical (relay) control.
❸ The contactors listed include fuse clips for 5.0 kV max. control power transformer primary fuses. Change the fifth (5th) position of the catalog number from "B" to "C" for contactors with 7.2 kV max. fuse clips, e.g. 1502-V4DCDA-1. No extra charge applies.
❹ The electrically held contactors are also available with 210 VDC coils (210 VDC coils are not available for mechanical latch contactors and they are not required when using IntelliVAC™ control). Change the sixth (6th) position of the contactor catalog number from "D" to "E" (e.g. 1502-V4DCEA-1), and also change the last position of the wire harness catalog number from "D" to "E". No extra charge applies.
❺ For use as bypass contactors with Bulletin 1503E MV SMC Flex controllers.
❻ When IntelliVAC™ or IntelliVAC Plus control is used, select altitude code zero (0) which allows the same contactor to be used from -1,000 to 5,000 metres; however, the contactor current must be de-rated per Appendix B.
❼ 1502-VC electrically held contactors are provided as fast drop out type, and drop out delays are controlled by the IntelliVAC™ Plus control module.
❽ If a 1503F OEM Power Cell and Frame, a 1503C or 1503E control panel, are ordered, a wire harness is provided.
❾ IntelliVAC™ Plus control can be selected below. Select an appropriate wire harness above, for use with IntelliVAC™ control.

Mechanical Latch Kit



1502-4MLK

Electrically-held, 400 Amp, Vacuum Contactors (Series E and later) can be retro-fitted with a mechanical latch assembly using this kit (1502-4MLK). The kit is suitable for use with vacuum contactors 1502-VC4DBDA-0, as listed in the above table.

The kit comes with all required components and instructions.
NOTE: The kit must be installed by qualified personnel.

If a mechanical latch contactor is known to be required, it is recommended that a suitable contactor be ordered direct from the factory (i.e. 1502-VC4DBDB-__).

Altitude Code/Derating Table

Altitude Rating	Altitude Code (Add to Catalog Number from Table above)	Return Spring Plating Color (400 A only)	Reduce Max. Continuous Current Rating by :		Reduce B.I.L. Withstand Rating by :
			400 A	800 A	
0 to 1,000 m (0 to 3,300 ft)	1	❶	—	—	—
1,001 to 2,000 m (3,301 to 6,600 ft)	2	Green	10 A	20 A	6.0 kV
2,001 to 3,000 m (6,601 to 9,900 ft)	3	Blue	20 A	40 A	12.0 kV
3,001 to 4,000 m (9,901 to 13,200 ft)	4	Black	30 A	60 A	18.0 kV
4,001 to 5,000 m (13,201 to 16,500 ft)	5	Olive	40 A	80 A	24.0 kV

❶ Standard 0 to 1000 m contactor has silver chromate return springs.

Assembled Power Cell and Frame

400 Amp

Description

The 1503F OEM controller is an open-frame-style structure that consists of a bolted construction frame housing the vacuum contactor, non-load-break isolation switch, and the isolation switch handle module. A control panel is also included and connects to the vacuum contactor to provide the necessary control functions for operating the controller. Available for voltages ranging from 2400 to 7200 volts.

The 1503F OEM controller requires additional components in order to fully construct a complete motor starter such as current transformers, power fusing, a control power transformer, overload protection, appropriate control circuitry for the application, and a suitable enclosure.

The factory-tested OEM frame includes as standard:

- Non-load-break fused isolation switch (see Switch Specifications, page 15)
- Isolation switch operating handle (see Handle Specifications, page 21)
- 2 N.O./2 N.C. auxiliary contacts on the isolator switch
- Vacuum contactor (see Vacuum Contactor Specifications, page 2, Bulletin 1502)
- Power cell door
- Contactor Control Module:

  The customer can select from three different contactor control options:

  1) IntelliVAC control module (see page 22, and publication 1503-UM053_-EN-P)

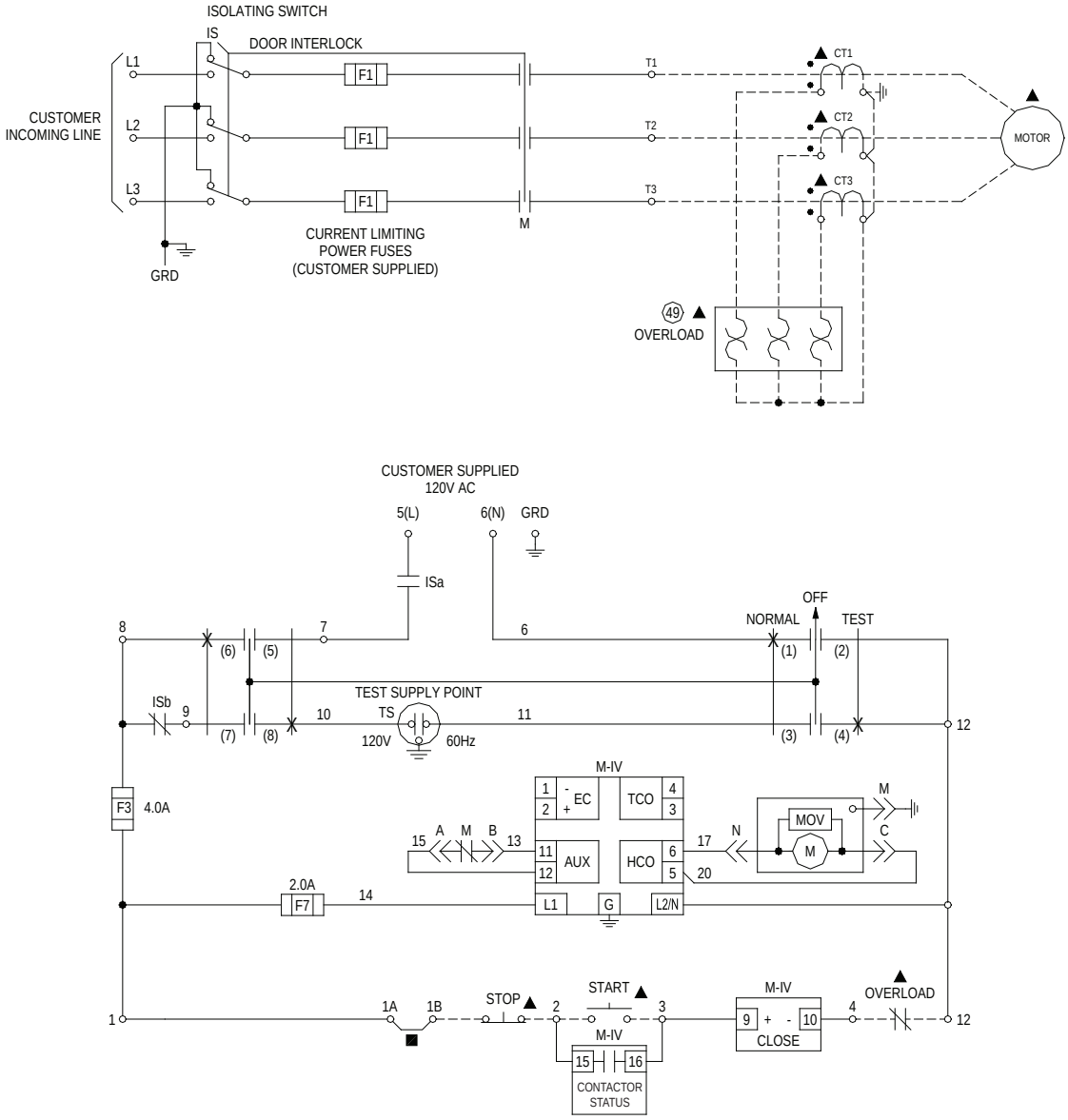
  2) IntelliVAC Plus control module (see page 22, and publication 1503-UM054_-EN-P)
  If the IntelliVAC is used to control more than one contactor, the IntelliVAC MC control module can be used with the IntelliVAC Plus in a master/slave relationship (see page 23, and publication 1503-UM054_-EN-P)

  3) Electromechanical relay control for 120 or 240 VAC control (see page 14).
- 10-ft (3.05-m) wire harness for 120 or 230 V AC control power
- OEM Starter Frame and Components • Installation Manual (Pub. 1503-IN050_-EN-P)

Power Fuses

Ferraz-Shawmut medium voltage power fuses are recommended for the Bulletin 1503F. These motor fuses have been tested and meet the co-ordination requirements for the Bulletin 1502 vacuum contactor.

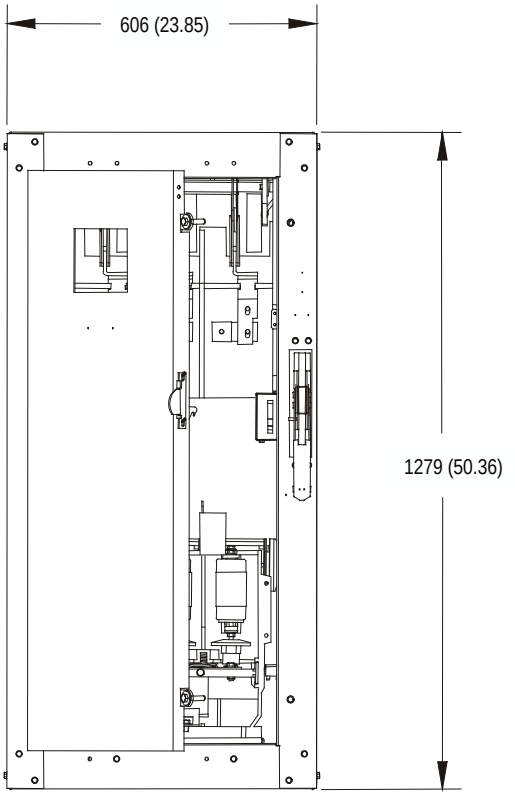
Typical Schematic • 120 V Control Circuit, 400A Electrically Held Contactor with IntelliVAC Control (including option 1503C-CPSx)



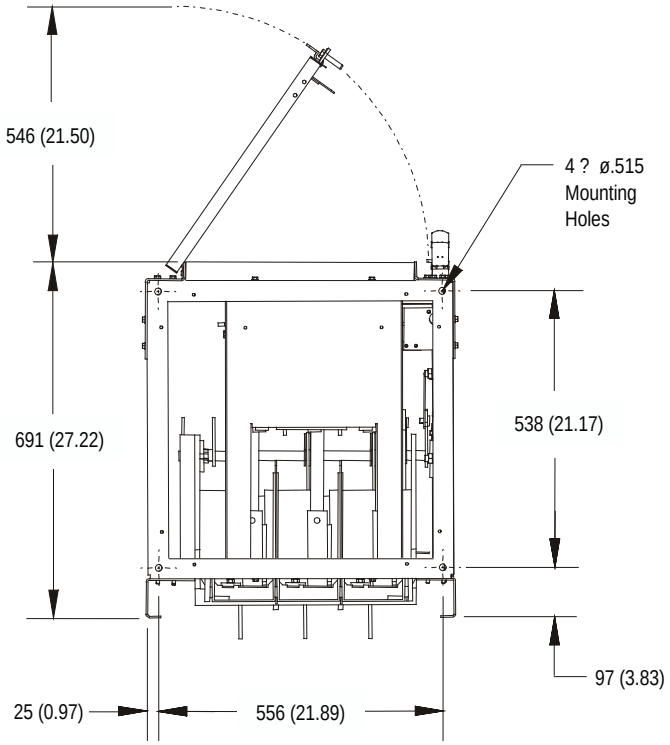
LEGEND
- – – CUSTOMER WIRING
- ■ REMOVE JUMPER WHEN CONNECTING REMOTE EQUIPMENT
- (#) "IEEE" NUMBER FOR PROTECTIVE DEVICE
- ▲ REMOTE EQUIPMENT

Assembled Power Cell and Frame (cont.)

• 400 A



Front View

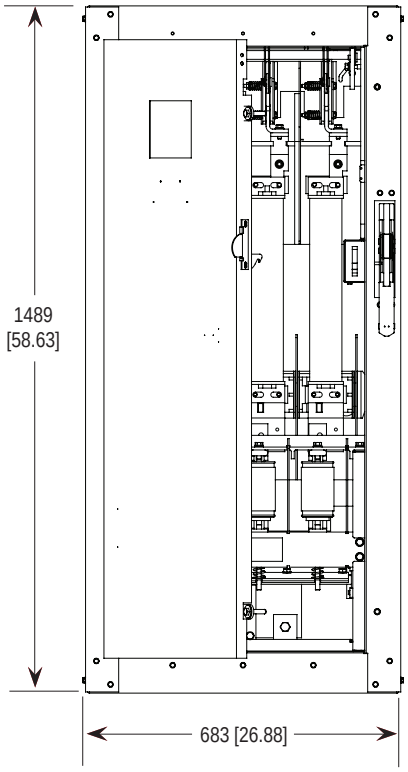


Bottom View

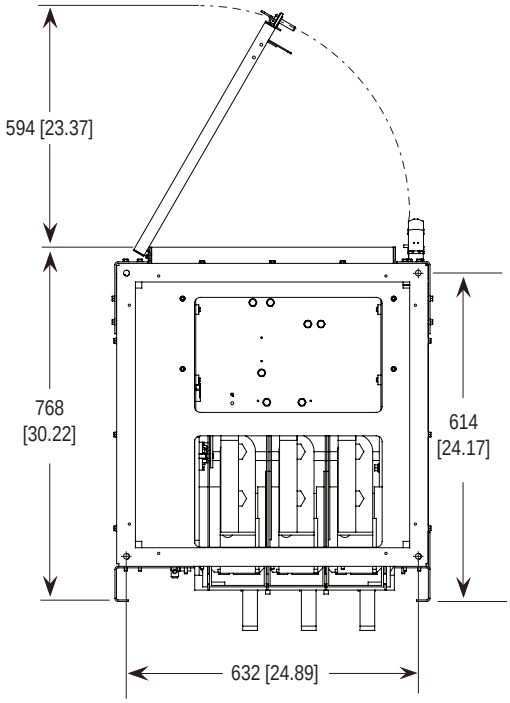
Approximate dimensions in millimeters (inches).

Net Shipping Weight (400A): 127 kg (280 lbs)

• 600 A



Front View



Side View

Approximate dimensions in mm [inches]

Frame

Options and Catalog Numbers

Current Rating (Amps) ❶	Voltage (kV)	Contactor Type	Fuse Clip	Control Method ❷❸❹❺		Control Voltage	Catalog Number
400	2.3 – 5.0	Electrically Held	Clip-on	Electro-mechanical		110 to 120 VAC	1503F-E4GCD
						220 to 230 VAC	1503F-E4GCE
				IntelliVAC	Base	110 to 240 VAC *or* 110 to 250 VDC	1503F-E4GCU
					MC		1503F-E4GCUM
					Plus		1503F-E4GCUP
			Bolt-on	Electro-mechanical		110 to 120 VAC	1503F-E4GBD
						220 to 230 VAC	1503F-E4GBE
				IntelliVAC	Base	110 to 240 VAC *or* 110 to 250 VDC	1503F-E4GBU
					MC		1503F-E4GBUM
					Plus		1503F-E4GBUP
		Mechanical Latch	Clip-on	Electro-mechanical		110 to 120 VAC	1503F-M4GCD
				IntelliVAC	Base	110 to 240 VAC *or* 110 to 250 VDC	1503F-M4GCU
					Plus		1503F-M4GCUP
			Bolt-on	Electro-mechanical		110 to 120 VAC	1503F-M4GBD
				IntelliVAC	Base	110 to 240 VAC *or* 110 to 250 VDC	1503F-M4GBU
					Plus		1503F-M4GBUP
	5.1 – 6.9	Electrically Held	Clip-on	Electro-mechanical		110 to 120 VAC	1503F-E4KCD
						220 to 230 VAC	1503F-E4KCE
				IntelliVAC	Base	110 to 240 VAC *or* 110 to 250 VDC	1503F-E4KCU
					MC		1503F-E4KCUM
					Plus		1503F-E4KCUP
			Bolt-on	Electro-mechanical		110 to 120 VAC	1503F-E4KBD
						220 to 230 VAC	1503F-E4KBE
				IntelliVAC	Base	110 to 240 VAC *or* 110 to 250 VDC	1503F-E4KBU
					MC		1503F-E4KBUM
					Plus		1503F-E4KBUP
		Mechanical Latch	Clip-on	Electro-mechanical		110 to 120 VAC	1503F-M4KCD
				IntelliVAC	Base	110 to 240 VAC *or* 110 to 250 VDC	1503F-M4KCU
					Plus		1503F-M4KCUP
			Bolt-on	Electro-mechanical		110 to 120 VAC	1503F-M4KBD
				IntelliVAC	Base	110 to 240 VAC *or* 110 to 250 VDC	1503F-M4KBU
					Plus		1503F-M4KBUP

❶ Refer to current derating table on page 7 for use above 1,000 m (3,300 ft.).
❷ Electromechanical Control includes a complete 1503C-xxx control panel assembly, for mounting by customer.
❸ All IntelliVAC Control options include an IntelliVAC (or IntelliVAC Plus / IntelliVAC MC) module and suitable 1503-WHxxx wire harness. A control power selector assembly, 1503C-CPSx, may be ordered separately (if required).
❹ IntelliVAC Plus is an enhanced version of control for vacuum contactors. Refer to page 22 for additional details.
❺ IntelliVAC MC is used for multi-contactor control schemes. One IntelliVAC Plus is required for multi-contactor schemes, and additional frames require an IntelliVAC MC. IntelliVAC Plus includes embedded DeviceLogix control for certain multi-contactor schemes.

Options and Catalog Numbers (cont.)

Current Rating (Amps) ❶	Voltage (kV)	Contactor Type	Fuse Clip	Control Method ❷ ❸ ❹ ❺		Control Voltage	Catalog Number
600	2.3 – 5.0	Electrically Held	Bolt-on	Electro-mechanical		110 to 120 VAC	1503F-E6GBD
				IntelliVAC	Base	110 to 240 VAC *or* 110 to 250 VDC	1503F-E6GBU
					MC		1503F-E6GBUM
					Plus		1503F-E6GBUP
		Mechanical Latch	Bolt-on	Electro-mechanical		110 to 120 VAC	1503F-M6GBD
				IntelliVAC	Base	110 to 240 VAC *or* 110 to 250 VDC	1503F-M6GBU
					Plus		1503F-M6GBUP
	5.1 – 6.9	Electrically Held	Bolt-on	Electro-mechanical		110 to 120 VAC	1503F-E6KBD
				IntelliVAC	Base	110 to 240 VAC *or* 110 to 250 VDC	1503F-E6KBU
					MC		1503F-E6KBUM
					Plus		1503F-E6KBUP
		Mechanical Latch	Bolt-on	Electro-mechanical		110 to 120 VAC	1503F-M6KBD
				IntelliVAC	Base	110 to 240 VAC *or* 110 to 250 VDC	1503F-M6KBU
					Plus		1503F-M6KBUP

❶ Refer to current derating table on page 7 for use above 1,000 m (3,300 ft.).
❷ Electromechanical Control includes a complete 1503C-xxx control panel assembly, for mounting by customer.
❸ All IntelliVAC Control options include an IntelliVAC (or IntelliVAC Plus / IntelliVAC MC) module and suitable 1503-WHxxx wire harness. A control power selector assembly, 1503C-CPSx, may be ordered separately (if required).
❹ IntelliVAC Plus is an enhanced version of control for vacuum contactors. Refer to page 22 for additional details.
❺ IntelliVAC MC is used for multi-contactor control schemes. One IntelliVAC Plus is required for multi-contactor schemes, and additional frames require an IntelliVAC MC. IntelliVAC Plus includes embedded DeviceLogix control for certain multi-contactor schemes.

Relay Control Panel

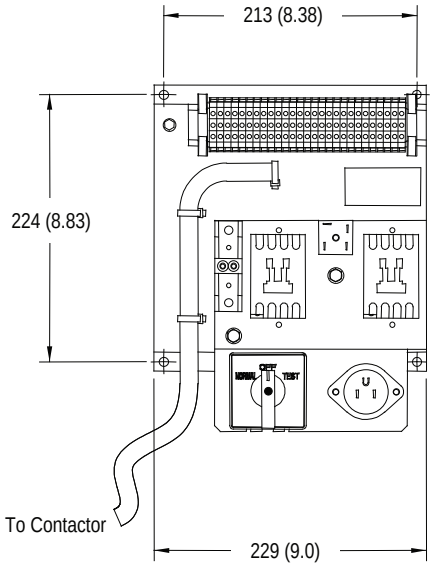
Description

Control panel and 10-ft (3.05 m) wire harness for connecting to the vacuum contactor. Control panel includes control relays, rectifier, MOV, terminal blocks (1492-W4), test switch and plug.

Note: A control panel for 110/120 V, 50/60 Hz shown.
A control panel for 220/240 V, 50/60 Hz does not include test plug. A control panel without a test switch and plug is available for multiple contactors. See page 43.

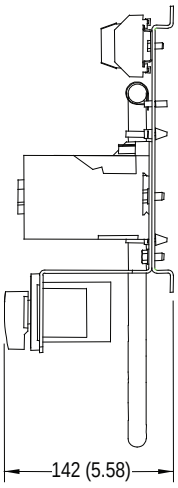
Specifications

Description	Specification	
Control	110/120 V AC, 50/60 Hz	220/240 V AC, 50/60 Hz
Cable	3.05 m (10 ft)	3.05 m (10 ft)
Terminal Blocks	Qty 27, 1492-W4	Qty 27, 1492-W4
Wire Gauge	#14 AWG	#14 AWG



Front View
(120 V AC)

Approximate dimensions in millimeters (inches).



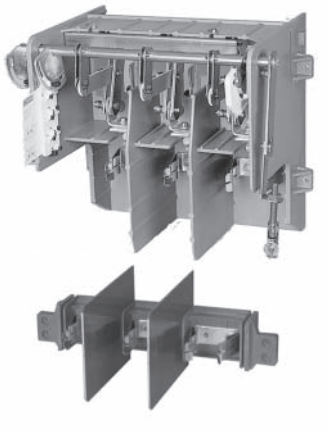
Side View

Options and Catalog Numbers

Voltage	Contactor Type	Catalog Number
110/120V AC 50/60 Hz	Electrically held – 400 A	1503C-E4D
	Mechanical latch – 400 A	1503C-M4D
	Electrically held – 800 A	1503C-E8D
	Mechanical latch – 800 A	1503C-M8D
220/230V AC 50/60 Hz	Electrically held – 400 A	1503C-E4E
	Electrically held – 800 A	1503C-E8E

The IntelliVAC controller is offered as a substitute for electro-mechanical control circuits, with numerous additional benefits. OEMs have a more flexible means of unit control that results in reduced overall panel space and enhanced control functionality.

Non-Load-Break Isolation Switch



Description

The isolation switch is a non-load-break type switch, and is available in clip-on or bolt-on fuse versions. The isolation switch works in conjunction with the contactor and the isolation switch handle to isolate the power cell when the isolation switch handle is moved to the OFF position.

Standard features:

- Clip-on or bolt-on fuse versions
- Line and load fuse clips
- Electrically and mechanically interlocked when used with the Allen-Bradley handle module and contactor
- Shutter mechanism isolates power cell from medium voltage

Specifications

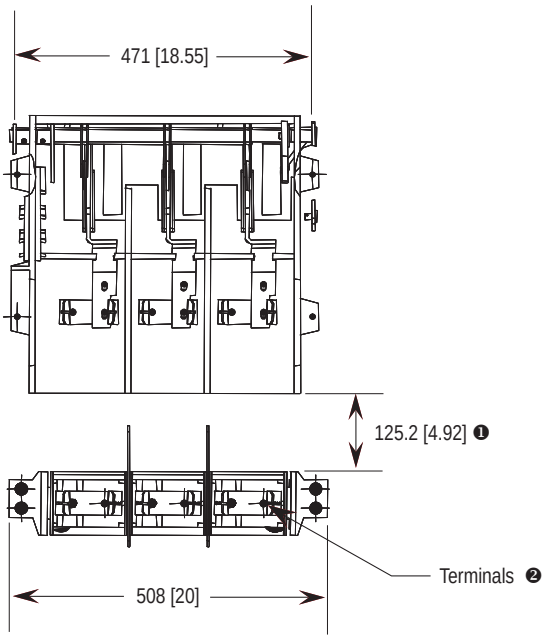
- 3 pole, gang operated
- 400, 600 or 800 Amp full load current
- Auxiliary contacts: – Provisions for 3 N.O./3 N.C.
  – 2 N.O./2 N.C. auxiliary contacts included
  Contact type: – Cat. No. 700-CPM
  Contact rating: – NEMA 2 x A600 and 2 x P600
- Net shipping weight: – 400A: 25 kg (55 lbs)
  – 600A: 35 kg (77 lbs)
  – 800A: Consult factory

Options and Catalog Numbers

Switch Size	Non-Load-Break Isolation Switch Options	Catalog Number
400 A	Clip-on fuse clips	1503S-4C
	Bolt-on fuse clips	1503S-4B
600 A	Clip-on fuse clips	1503S-6C
	Bolt-on fuse clips	1503S-6B
800 A	Bolt-on fuse clips	1503S-8B

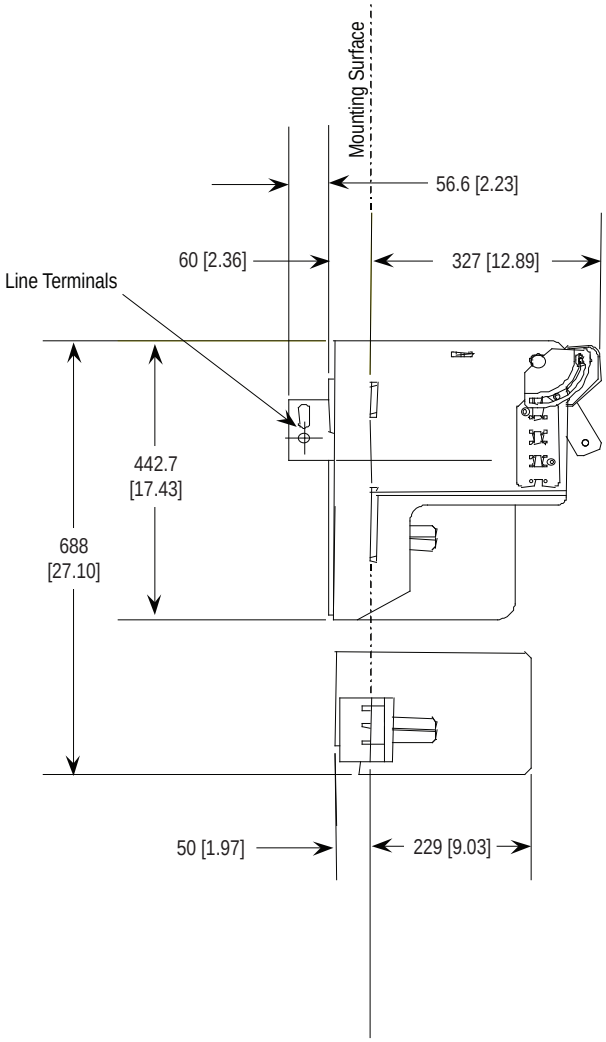
Isolation Switch (cont.)

• 400 A (Clip-On Fuses)



❶ Assumes a 403.4 mm [15.88 in.] fuse is used.
❷ Includes terminal connection hardware.

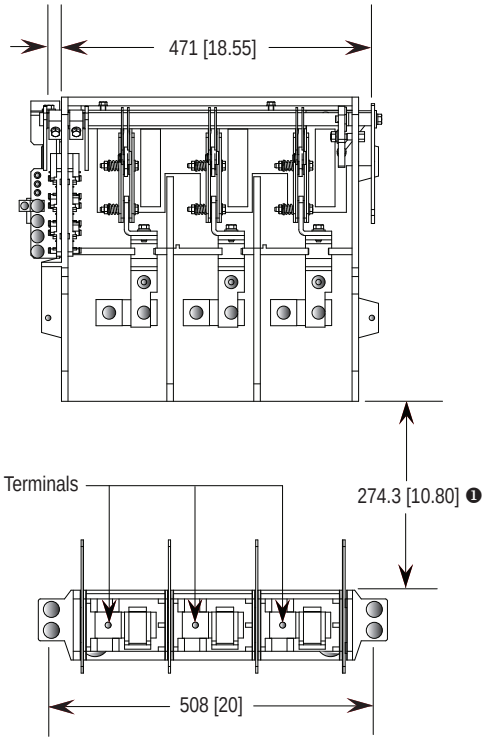
Front View

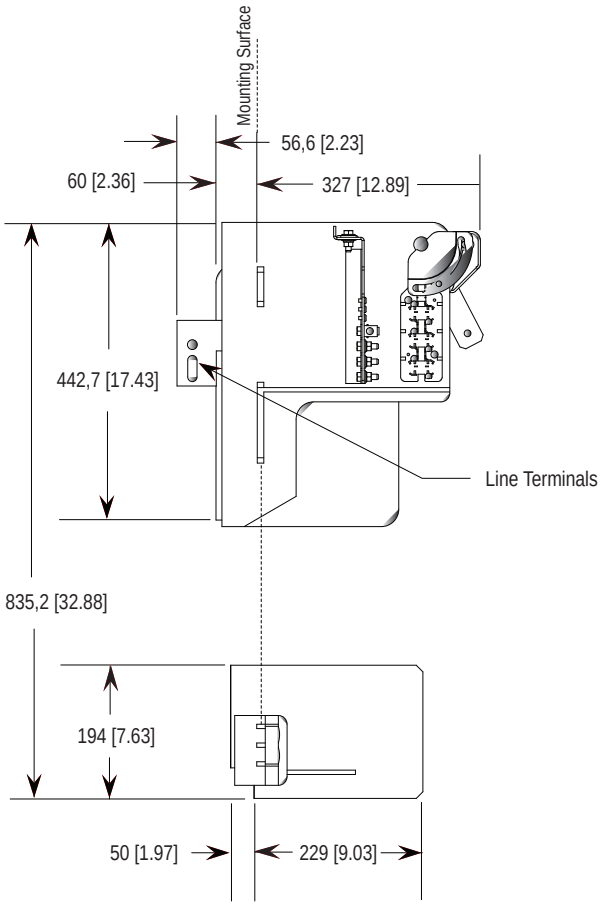


Side View

Approximate dimensions in millimeters [inches]

• 400 A (Bolt-On Fuses)





❶ Assumes a 489 mm [19.25 in.] fuse is used.

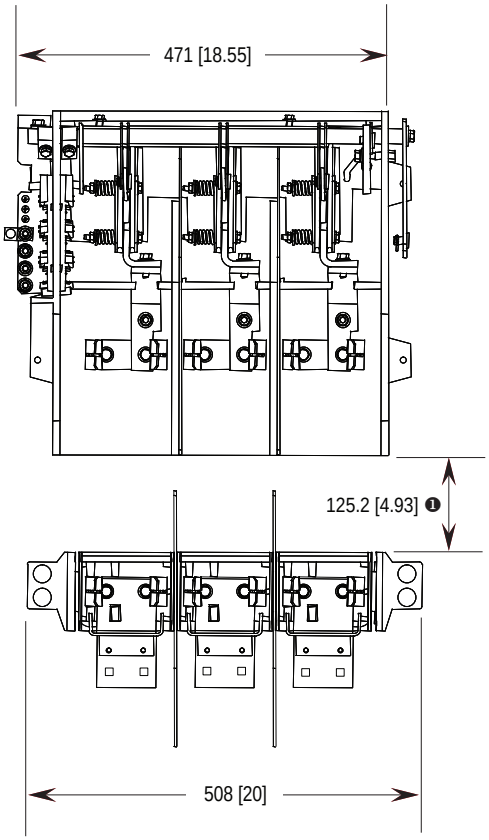
Front View

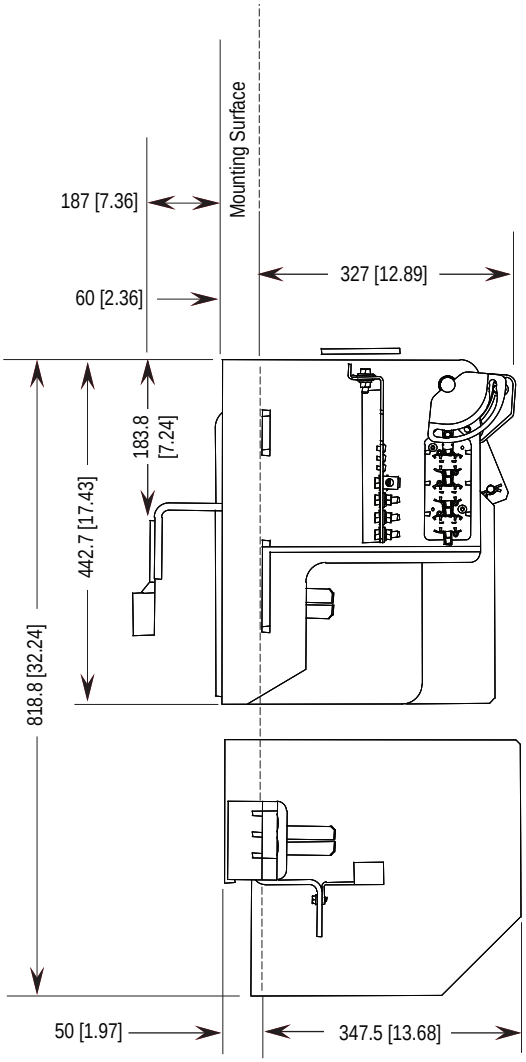
Side View

Approximate dimensions in millimeters [inches]

Isolation Switch (cont.)

• 600 A (Clip-On Fuses)





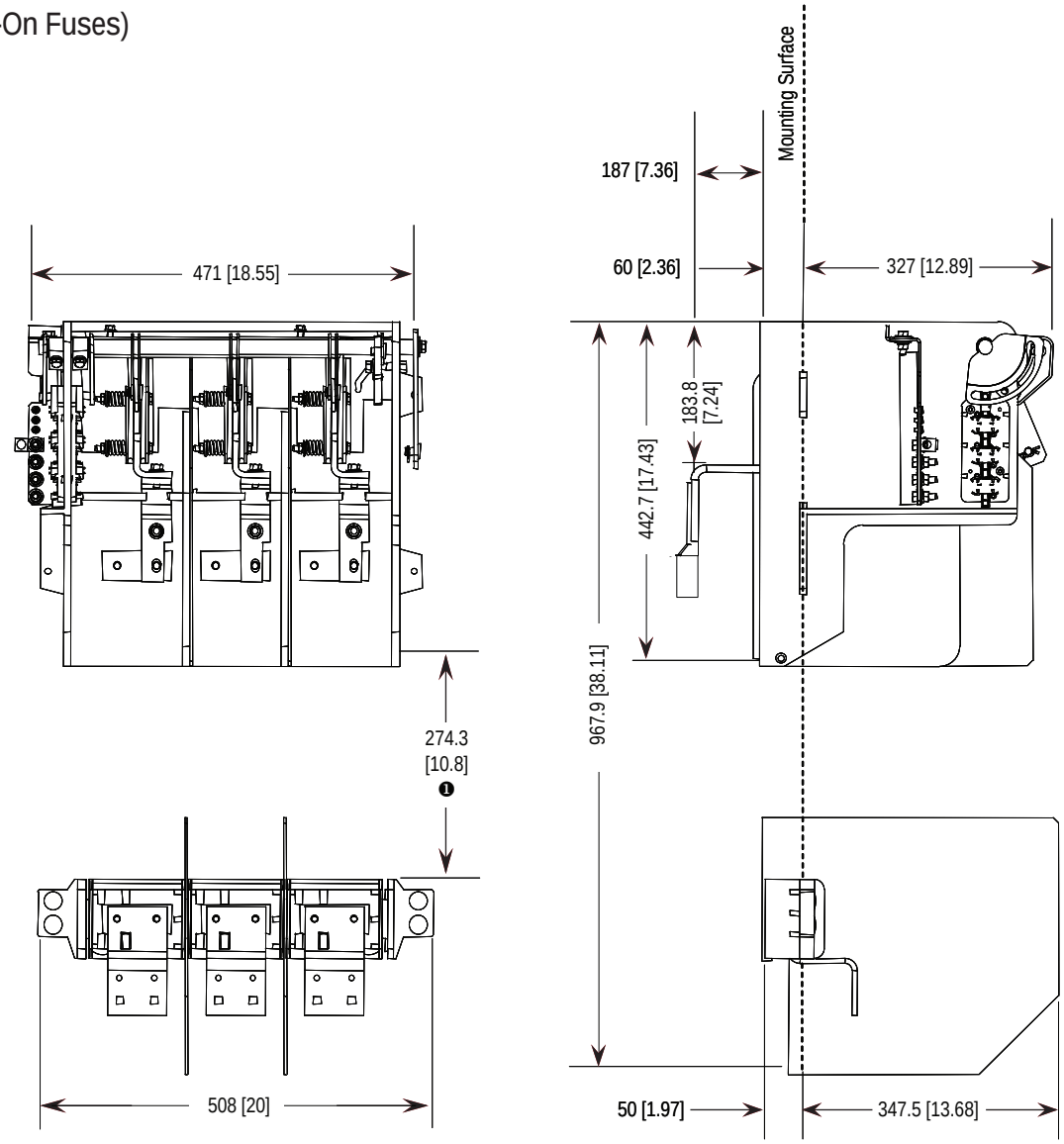
❶ Assumes a 403.4 mm [15.88 in.] fuse is used.

Front View

Side View

Approximate dimensions in millimeters [inches]

• 600 A (Bolt-On Fuses)



❶ Assumes a 489 mm [19.25 in.] fuse is used

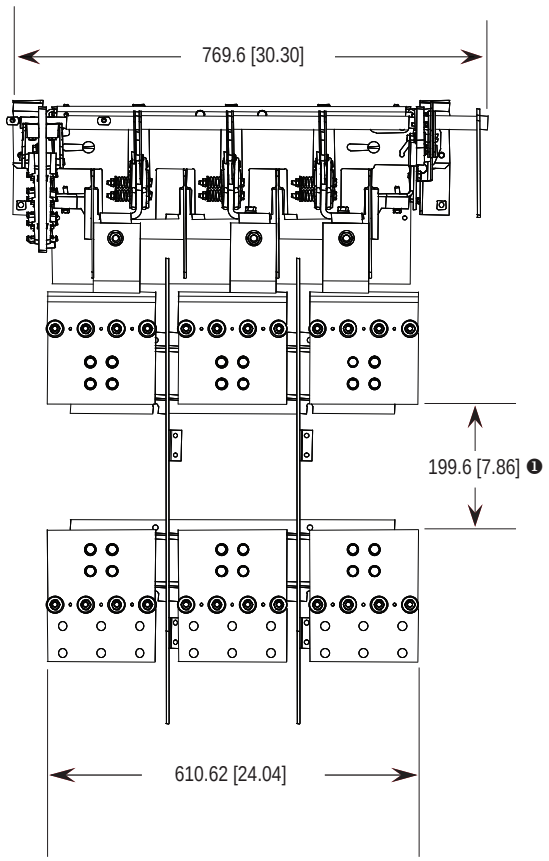
Front View

Side View

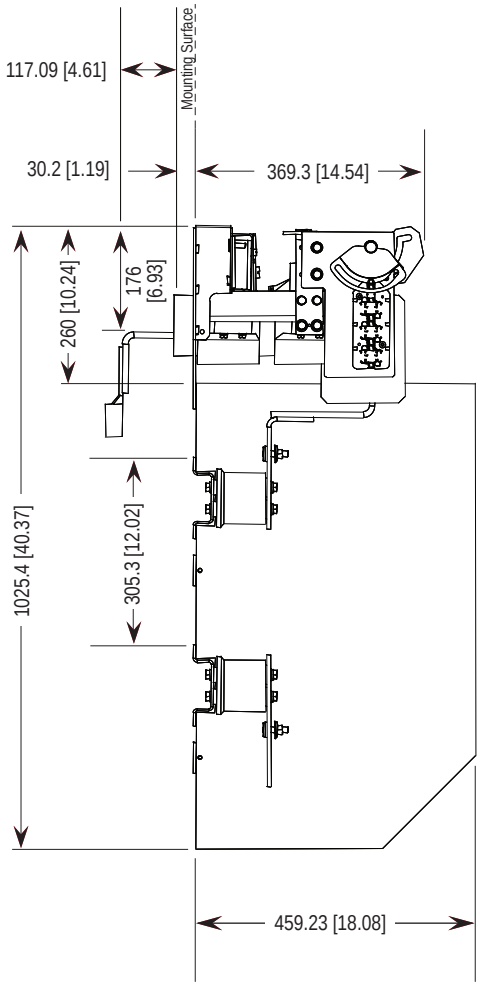
Approximate dimensions in millimeters [inches]

Isolation Switch (cont.)

- 800 A (Bolt-On only Fuses)



Front View



Side View

❶ Assumes a 489 mm [19.25 in.] fuse is used.

Approximate dimensions in millimeters [inches]

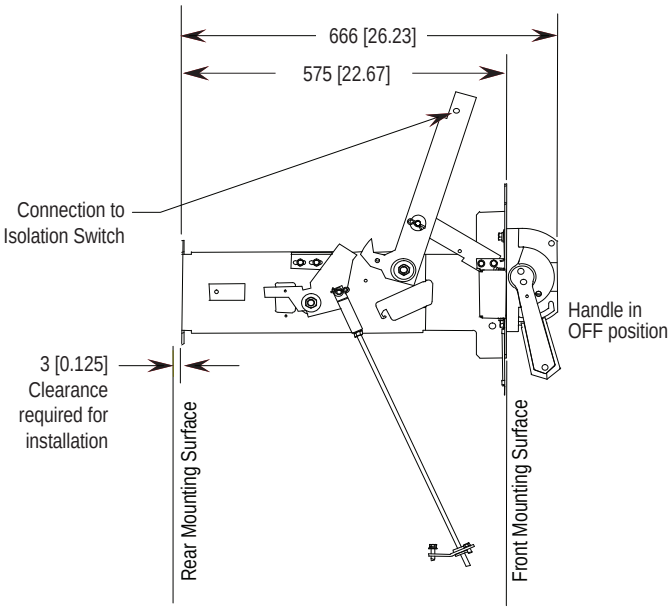
Isolation Switch Handle Module

Description

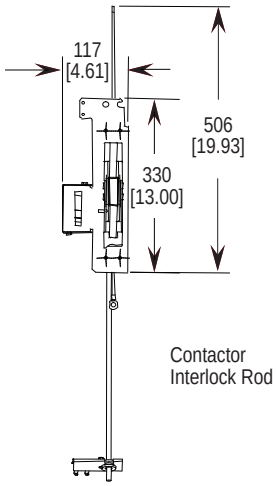
Standard handle and mechanical interlock assembly complete with provisions for key interlocking.

Specifications

- Padlocking provision: up to 3 padlocks in open position, 1 padlock in closed position
- Interlock with the power cell door
- Provision for key interlocking



Left Side View (400A)



Front View (400A)
(Cut away to show lower mounting holes)

Approximate dimensions in millimeters [inches]

Options and Catalog Numbers

Description of Handle		Catalog Number
Isolation Switch Handle Module	400 A	1503-HM1
	600 A and 800 A	1503-HM2

1503VC

INTELLIVAC™ FAMILY OF CONTROL MODULE FOR MV VACUUM CONTACTORS

Advanced Digital Control of Vacuum Contactors

The Allen-Bradley Bulletin 1503VC family of IntelliVAC controllers offers a superior, efficient and flexible means of controlling Bulletin 1502 vacuum contactors. The IntelliVAC family offers a scalable solution for multiple medium voltage control applications. The IntelliVAC family has three main products:

- IntelliVAC provides basic control capabilities for 400 and 800 Amp contactors (electrically held and mechanical latch) using a single device. It offers enhanced reliability through better diagnostics and coordination between the power fuses and the vacuum contactor drop-out time. Productivity is improved using the power loss ride through (TDUV) and contactor anti-kiss and anti-plugging features.
- IntelliVAC Plus builds on IntelliVAC with incremental benefits such as DeviceNet communication (including IntelliCENTER software compability), digital I/O (8 inputs, 2 outputs), DeviceLogix™ control and enhanced diagnostics.
- IntelliVAC MC is used in multi-contactor applications, allowing one IntelliVAC Plus to control up to four IntelliVAC MC control modules in a Master-Slave configuration. Control and timing logic is handled in DeviceLogix, minimizing control hardware and wiring.

IntelliVAC™

IntelliVAC™ Control Module (Part Number 1503VC-BMC5)

- The IntelliVAC control module has a universal input voltage (110 - 240 V AC, 50/60 Hz or 110 - 250 V DC)
- Consistent vacuum contactor pick-up time, ensures optimal synchronization
- Selectable and repeatable vacuum contactor drop-out times (50, 75, 100, 130, 150, 175, 200 or 240 msec) for better coordination with power fuses
- Altitude compensation (-1,000 to 5,000 meters) eliminates mechanical hardware changes at high altitude (400 Amp vacuum contactors)
- Power loss ride-through logic (TDUV) with selectable drop out time (0.2, 0.5, 1.0 or 2.0 sec) requires only an external capacitor
- Anti-kiss and anti-pumping protection
- Status indication (LEDs and relay outputs) allows integration in control system and aids troubleshooting
- Temporary motor jog function (separate input) to allow process set-up
- Delayed motor re-start prevents rapid cycling of vacuum contactor, protecting the connector motor

IntelliVAC™ Plus

IntelliVAC Plus Control Module (Part Number 1503VC-BMC5-EM1)

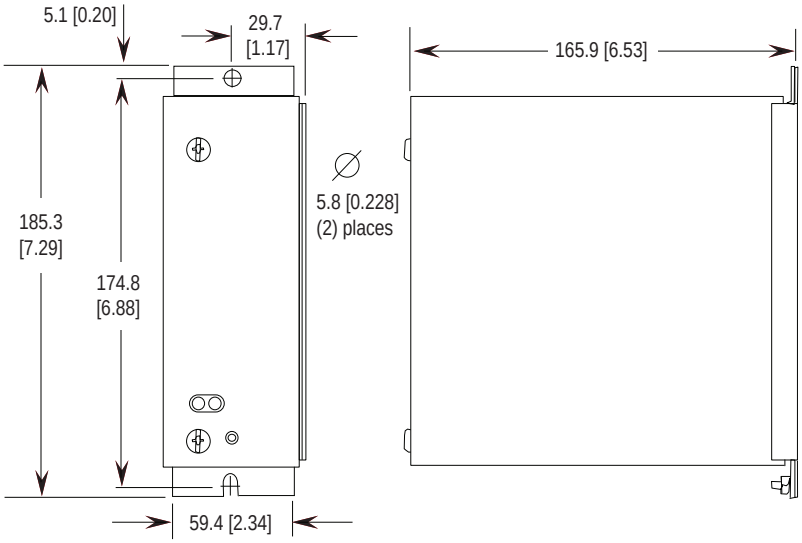
- The IntelliVAC Plus control module has the same features as the IntelliVAC, with the additional capacilities below
- DeviceNet communication
- DeviceLogix control
- Digital inputs (8), rated for 110 to 250 VAC or VDC, and outputs (2), rated up to 250 VAC or VDC, all with LEDs indicating status
- Support for multi-contactor (MC) control schemes, with up to four slave IntelliVAC MC units connected on RS485, and DeviceLogix pre-configured for standard MV controller logic (can also define Custom MC control configurations)
- Enhanced operational information and diagnostics with features like real-time clock, extended contactor close time monitoring and tracking of contactor usage
- IntelliCENTER software compatibility
- Configurable using either RS Networx or handheld configuration terminal (Bulletin 193-DNCT) for DeviceNet

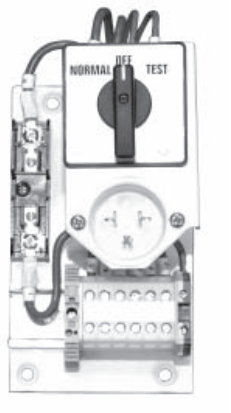
IntelliVAC™ MC

IntelliVAC MC Control Module (Part Number 1503VC-BMC5-MC1)

- The IntelliVAC Plus control module has the same features as the IntelliVAC, with the additional following capabilities:
  - Communication board (RS485) to allow the “MC” module to be controlled by one IntelliVAC Plus for multi-contactor control schemes

Dimensions





Control Power Selector Assembly

Control Power Selector Assembly

A selector switch and power receptacle are provided to allow “Normal”, “Off” and “Test” sources of control power for the IntelliVAC control Module. A 115 V AC receptacle, suitable for use in North America, is provided as part of the 1503C-CPS1.

Catalog Numbers

IntelliVAC ❶	1503VC-BMC5	Electrically Held and Mechanically Latched Vacuum Contactors (400/800A) – Series D
Control Power Selector Assembly ❷	1503C-CPS1	With 120V AC receptacle for NA power cords
	1503C-CPS2	With provisions for mounting a power receptacle (provided by customer)

❶ A wire harness for 1502 vacuum contactors is generally required. Refer to page 7.
❷ For use with IntelliVAC control module.

IntelliVAC Control Module Specifications ❸

IntelliVAC Catalog Numbers ❺		Vacuum Contactor Type	
1503VC-BMC5	IntelliVAC	Electrically Held or Mechanical Latch	
1503VC-BMC5-EM1	IntelliVAC Plus		
1503VC-BMC5-MC1	IntelliVAC MC	Electrically Held	
Ratings and Approvals			
Input Voltage		AC – 110 to 240 V, 47 to 63 Hz ❶	
		DC – 110 to 250 V	
Input Current ❷	**AC ❶**	Inrush (max.)	– 25 A (1/2 cycle)
		Idle (max.)	– 125 mA
		Close (max.)	– 11.3 A
		Hold (max.)	– 300 mA
		Latch Trip (max.)	– 7.0 A
	DC	Inrush (max.)	– 25 A
		Idle (max.)	– 35 mA
		Close (max.)	– 4.8 A
		Hold (max.)	– 100 mA
		Latch Trip (max.)	– 3.7 A
Command Inputs		AC – 110 to 240 V, 9 mA max. ❶	
		DC – 50 to 250 V, 9 mA max.	
IntelliVAC Plus Inputs ❹		AC – 100 to 240 V, 9 mA max. ❶	
		DC – 50 to 250 V, 9 mA max.	
Status Output Contacts		AC – 250 V, 5 A, R load ❶	
		DC – 30 V, 5 A, R load	
IntelliVAC Plus Output Contacts ❹		AC – 250 V, 5 A, R load	
		DC – 30 V, 5 A, R load	
Standards and Approval		cULus, IEC, CE	

❶ All AC values are rms, except where noted.
❷ The maximum currents shown are for either the 400A or 800A Bulletin 1502 vacuum contactors. Close current duration is 200 milliseconds.
❸ Common ratings for all versions of IntelliVAC, except where noted.
❹ Available with IntelliVAC Plus (1503VC-EMC1) only.
❺ A wire harness is required for Bulletin 1502 vacuum contactors when IntelliVAC is used.

Description

The MV SMC Flex reduced voltage starter provides microprocessor controlled starting for standard three-phase, squirrel-cage induction motors. Several standard modes of operation are available within a single controller:

- Soft Start – with selectable kickstart
- Soft Stop
- Current Limit Start – with selectable kickstart
- Linear Acceleration* – with selectable kickstart
- Linear Deceleration*
- Dual Ramp – with selectable kickstart
- Full Voltage
- Preset Slow Speed

* requires motor tachometer

Optional Control Module

- Pump Control (eliminates water hammer) – separate start and stop profiles

SMC Flex
Control Module

Features

- Electronic motor overload protection
- Metering (MW, MWh, Power Factor, V, I)
- Build-in DPI communication
- Three-line, 16-character backlit LCD display
- Keypad programming
- Four programmable auxiliary contacts
- Fiber optic SCR gate firing
- Self-powered current loop gate driver boards (patent pending)

Optional Communication Modules

The following communication boards mount within the control module:

- DeviceNet (20COMM-D)
- ControlNet (20COMM-C)
- Ethernet/IP (20COMM-E)
- Profibus DP (20COMM-P)
- Remote I/O (20COMM-R)
- RS485 (DFI) (20COMM-S)

To construct an SMC Flex reduced voltage starter, use the Product Selection Guide below as a guide.

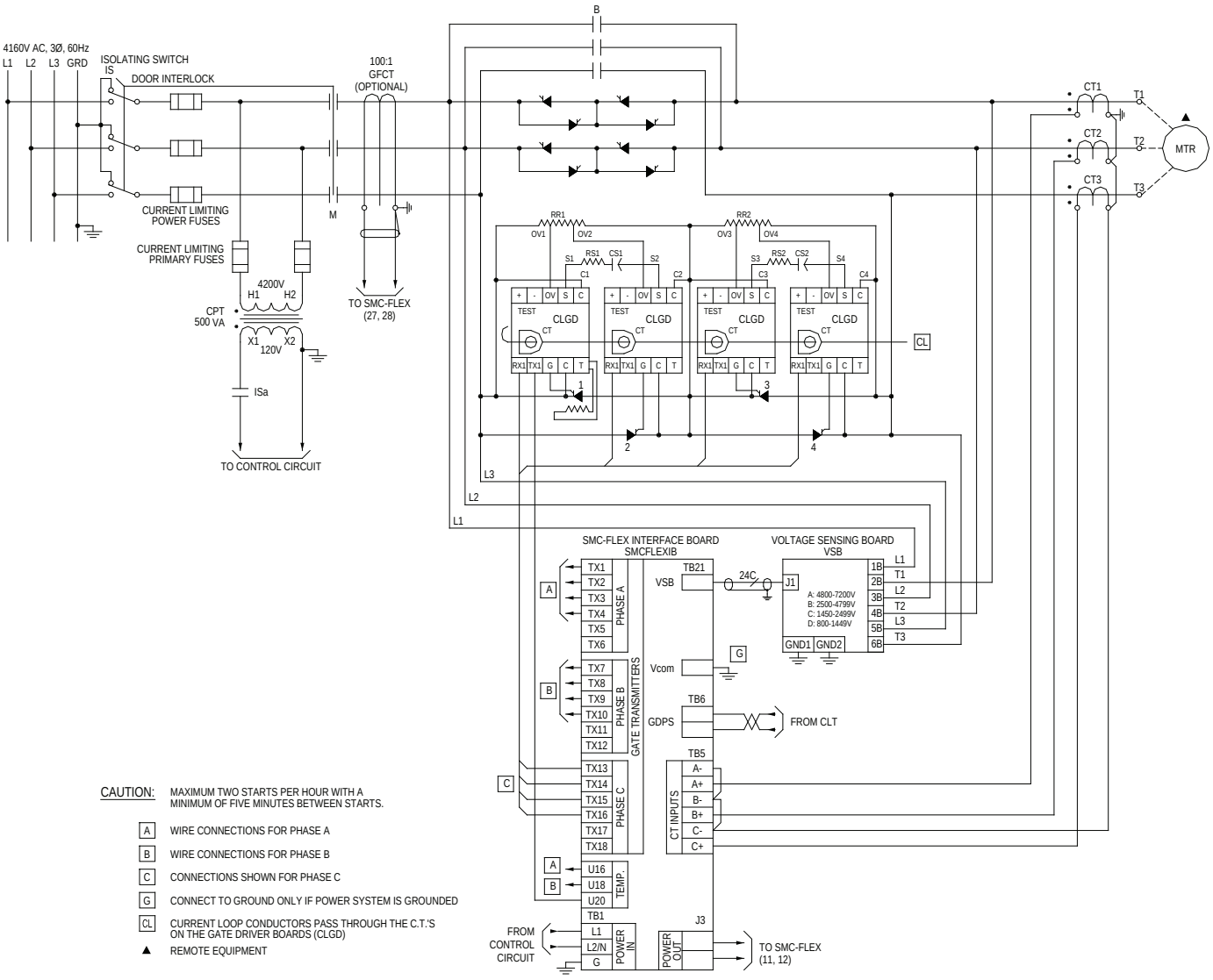
Product Selection Guide

Description	Frame 1000-4160V, 180-360 Amp	Power Stacks 1000-6900V 180-600 Amp ❺
Control Module (page 39)	Required	Required
Interface Board (page 38)	Required	Required
Fibre Optic Cables (page 41)	Required	Required
Voltage Sensing Board (page 37)	❶	Required
Control Panel / IntelliVAC	Optional ❷	Optional ❷
Bypass Contactor (page 44)	Optional ❸	Optional ❸
Gate Drive Test Power Supply (page 42)	Optional ❹	Optional ❹

❶ Included in frame as standard.
❷ Required when Bulletin 1502 bypass contactor is selected.
❸ Bulletin 1502 vacuum contactor can be supplied. If not selected, OEM must supply a bypass contactor with equivalent specifications. The SCRs must be bypassed once the driven load is up to speed. The SCRs are not rated for continuous duty; failure to bypass the SCRs will result in component failure. Bypass contactors must have a drop-out time less than 60 msec.
❹ Required for testing, commissioning, and troubleshooting gate-firing circuits.
❺ 180-360 Amps for 1000 V

Typical Power System Diagram – 3300/4160 V

(Requires input disconnection [optional], as well as main and bypass vacuum contactors)

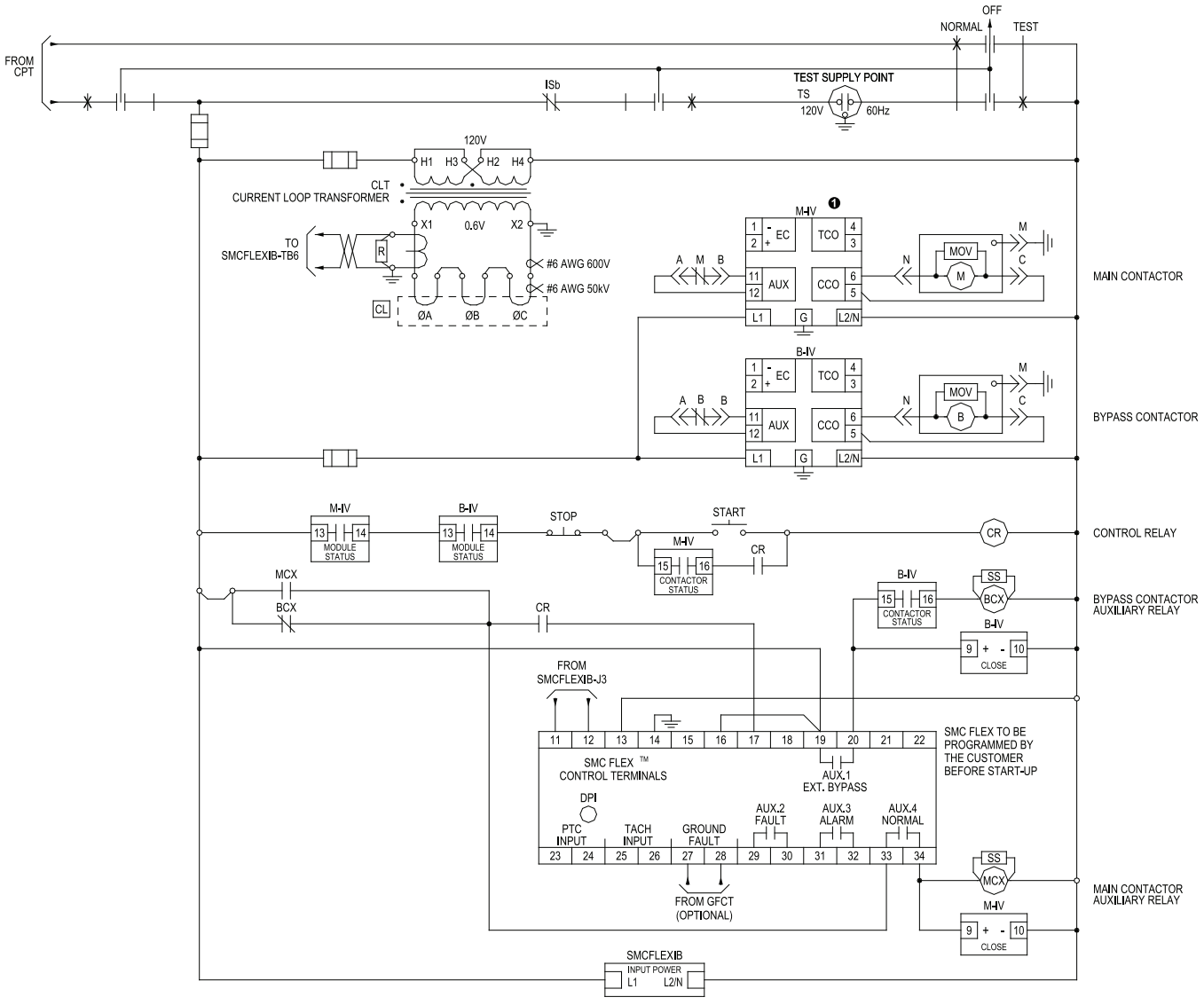


CAUTION: MAXIMUM TWO STARTS PER HOUR WITH A MINIMUM OF FIVE MINUTES BETWEEN STARTS.

- A — WIRE CONNECTIONS FOR PHASE A
- B — WIRE CONNECTIONS FOR PHASE B
- C — CONNECTIONS SHOWN FOR PHASE C
- G — CONNECT TO GROUND ONLY IF POWER SYSTEM IS GROUNDED
- CL — CURRENT LOOP CONDUCTORS PASS THROUGH THE C.T.'S ON THE GATE DRIVER BOARDS (CLGD)
- ▲ — REMOTE EQUIPMENT

Typical Control Circuit – Standard Module

(Requires optional Main and Bypass control panels, as well as control relays and pilot devices)



❶ IntelliVAC control modules

1503E
MV SMC™ FLEX OEM KITS

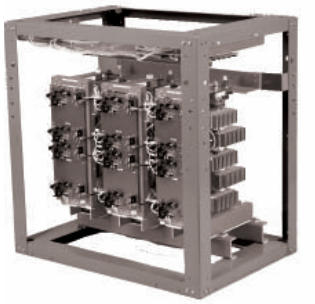
Functional Design Specifications

Features			Description
Standard Features	Installation	Power Wiring	The MV SMC Flex Controller must be wired with an isolation contactor as per local/regional codes. Bypass contactors must be employed after the controller has brought the motor to full speed.
		Control Wiring	2- and 3-wire control for a wide variety of applications.
	Set-up	Keypad	The MV SMC Flex Controller is configured with the front keypad and backlit LCD display.
		Software	Parameter values can be downloaded to the MV SMC Flex Controller with Drive Tools programming software and an optional (20COMM-x) communication module.
	Communications (two ports)		One serial (DPI) port provided for connection to optional human interface One serial (DPI) port provided for optional 20-COMMx modules (mounted within SMC Flex control module)
	Starting Modes		Soft Start with selectable kickstart, Soft Stop, Current Limit Start with selectable kickstart, Linear Acceleration with selectable kickstart, Linear Deceleration, Dual Ramp with selectable kickstart, Full Voltage, Preset Slow Speed
	Protection and Diagnostics		Power loss, line fault, voltage unbalance, current unbalance, excessive starts/hour, phase reversal, undervoltage, overvoltage, controller temperature, stall, jam, open gate, overload, underload, communication fault, ground fault
	Metering		Amps, volts, elapsed time, motor thermal capacity usage, power (MW, MWh, PF)
	Status Indication		Stopped, ramping, stopping, at speed, and fault.
	Auxiliary Contacts		One single-pole, double-throw contact programmable as normal or External Bypass; one contact programmable as normal or fault.
	Control Voltage		110/120 V AC to 220/240 V AC; 50/60 Hz
	Fibre Optic Cables		Available in two lengths (2.5 m and 5.0 m). Provides isolation between interface board and power stacks.
	Soft Stop		Extended coast-to-rest to minimize load shifting. Ramp down time may be adjusted. ❶
Optional Features	Pump Control		Helps reduce fluid surges in centrifugal pumping systems during starting and stopping period. Starting time is adjustable from 0 to 30 seconds. Depending on application, stopping time may be adjusted. ❶
	Bypass Contactor		Required to bypass the SCRs once the motor is up to speed. Bulletin 1502 can be supplied with SMC OEM kits.
	Communication Modules		DeviceNet, ControlNet, Ethernet/IP, Profibus DP, Remote I/O, RS485 (DF1)

❶ Thermal capacity limits must not be exceeded.
The combined maximum ratings for MV SMC Flex units are as follows:
- 30 second Start/Stop
- 40°C Ambient temperature
- 2 Start/Stop per hour
- 450% FLC (average during starting)

If any of the above maximums are not required, it is generally possible to exceed some of the other ratings.
Please consult factory for details.

Assembled Frame



Description

The Bulletin 1503 MV SMC Flex OEM frame is a self-contained power unit that can be easily installed. To fully install the frame, the OEM must complete the following:

- Connect power cables from the power stacks in the frame to the input power disconnection mechanism, bypass contactor, and motor;
- Mount the SMC Flex control module on the interface board and connect the interface board to the voltage sensing board with wires, and the gate driver boards with fiber optic cables;
- Connect the interface board to OEM-supplied current transformers.

The vacuum bypass contactor is connected in parallel with the SCRs and is controlled by a contact on the SMC Flex control module that opens and closes the vacuum contactor.

The frame includes:

- Three Power Stacks, comprised of heat sinks, SCRs, snubber caps and resistors, and gate driver boards
- Voltage sensing circuit board
- Installation Manual

Specifications

<table>
<tr><th>Description</th><th colspan="3">180 A</th><th>360 A</th></tr>
<tr><td>Input Voltages ❶
(50/60 Hz)</td><td colspan="4">1000 volts AC, 3 phase, +10% -15%
2300 volts AC, 3 phase, +10% -15%
3300 volts AC, 3 phase, +10% -15%
4160 volts AC, 3 phase, +10% -15%</td></tr>
<tr><td>Ambient Temperature</td><td colspan="4">0°C to 40°C (32°F to 104°F)</td></tr>
<tr><td>Power Section</td><td colspan="2">6 SCR at 1000 volts
6 SCR at 2400 volts</td><td colspan="2">12 SCR at 3300 volts
12 SCR at 4160 volts</td></tr>
<tr><td>Repetitive Peak
Inverse Voltage Rating</td><td colspan="2">1000 volts – 4500 PIV
2400 volts – 6500 PIV</td><td colspan="2">3300 volts – 13000 PIV
4160 volts – 13000 PIV</td></tr>
<tr><td>Thermal Capacity</td><td colspan="4">600% of FLA, 10 seconds (2 starts per hour, 5 minutes between starts) ❷
450% of FLA, 30 seconds (2 starts per hour, 5 minutes between starts) ❷</td></tr>
<tr><td>dv/dt Protection</td><td colspan="4">R.C. Snubber Network</td></tr>
<tr><td rowspan="4">Maximum Heat
Dissipation (kW)</td><td colspan="3">Start or Stop Cycle (@ 450% FLA)</td><td>Continuous</td></tr>
<tr><td></td><td>180 A</td><td>360 A</td><td></td></tr>
<tr><td>800 to 2400 V</td><td>7</td><td>13</td><td>.25</td></tr>
<tr><td>2401 to 5000 V</td><td>14</td><td>26</td><td>.25</td></tr>
<tr><td>Altitude</td><td colspan="4">0 to 1000 m (0 to 3,300 ft)
(See Controller Deratings Table on page 7)</td></tr>
<tr><td>Net Weight
(Shipping)</td><td colspan="4">1000 to 2400 V – 116 kg (255 lbs)
3300 to 4160 V – 125 kg (276 lbs)</td></tr>
</table>

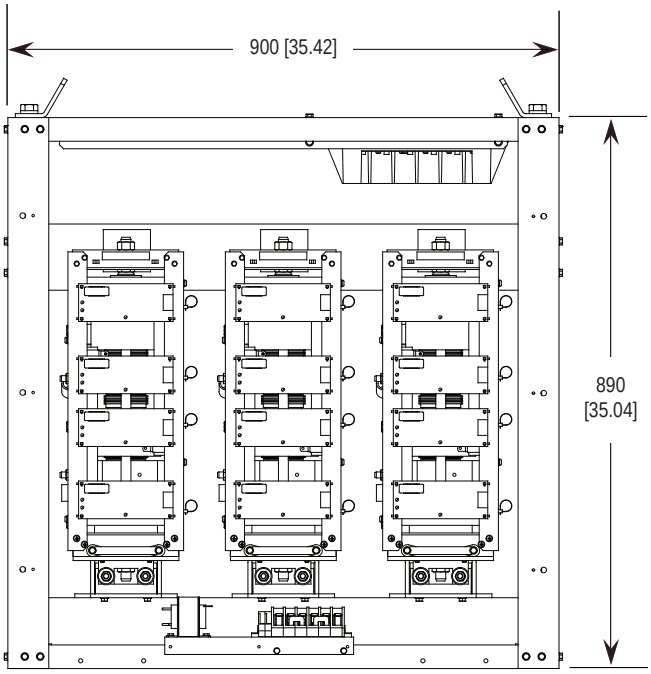
❶ Refer to page 30 for acceptable input voltage ranges.
❷ May require forced ventilation.

MV SMC FLEX OEM KITS – SMC™ FLEX FRAME

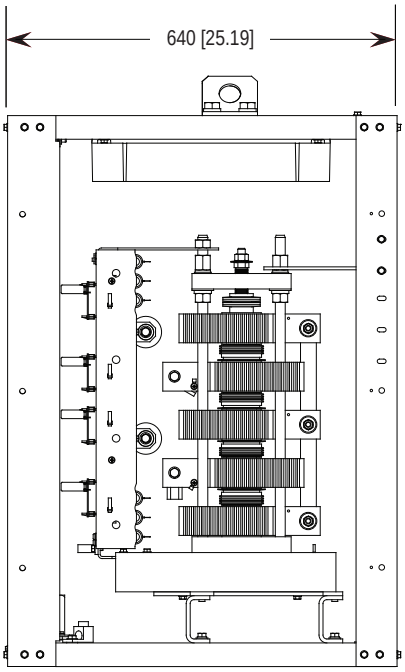
Options and Catalog Numbers

Description of Frame Options ❶	Catalog Number
1000 V, 180 A, 3 phase, 50/60 Hz	1503E-FRZ1T
1000 V, 360 A, 3 phase, 50/60 Hz	1503E-FRZ1A
2300 V, 180 A, 3 phase, 50/60 Hz	1503E-FRAT
2300 V, 360 A, 3 phase, 50/60 Hz	1503E-FRAA
3300 V, 180 A, 3 phase, 50/60 Hz	1503E-FRCT
3300 V, 360 A, 3 phase, 50/60 Hz	1503E-FRCA
4160 V, 180 A, 3 phase, 50/60 Hz	1503E-FRET
4160 V, 360 A, 3 phase, 50/60 Hz	1503E-FREA

❶ Voltage ranges : 1000 = 800 to 1449V
2300 = 1450 to 2499V
3300/4160 = 2500 to 4799V



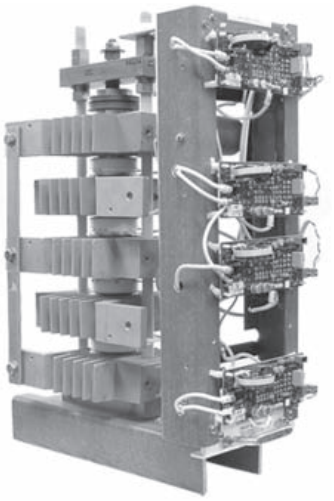
Front View



Side View

Approximate dimensions in millimeters [inches].

Power Stack



Description

The Bulletin 1503 MV SMC Flex OEM Power Stack consists of three modular power stacks that provide excellent mounting flexibility. To fully install the power stacks, the OEM must complete the following:

- Connect power cables from the power stacks to the input power disconnection mechanism, bypass contactor, and motor;
- Mount the SMC Flex control module on the interface board and connect interface board to the voltage sensing board and the gate driver boards with fiber optic cables;
- Mount voltage sensing board and connect to the line and load terminals;
- Connect the interface board to OEM-supplied current transformers.

The vacuum bypass contactor is connected in parallel with the SCRs and is controlled by a contact on the SMC Flex control module that opens and closes the vacuum contactor.

The power stacks include:

- Three power stacks, comprised of heatsinks, SCRs, snubber caps and resistors
- Gate driver boards and mounting hardware
- Installation Manual

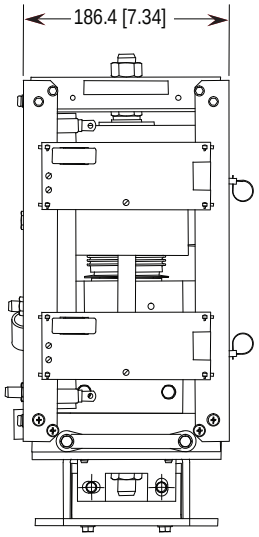
Specifications

Description	180 A, 360 A, 600 A			
Input Voltages (50/60 Hz)	1000 volts AC, 3 phase, +10%, -15% ❶ 2300 volts AC, 3 phase, +10%, -15% 3300 volts AC, 3 phase, +10%, -15% 4160 volts AC, 3 phase, +10%, -15% 6900 volts AC, 3 phase, +10%, -15%			
Ambient Temperature	0°C to 40°C (32°F to 104°F)			
Power Section (for 3 phases)	6 SCR at 2400 volts 12 SCR at 3300 volts	12 SCR at 4160 volts 18 SCR at 6900 volts		
Repetitive Peak Inverse Voltage Rating	1000 volts – 4500 PIV 2400 volts – 6500 PIV	3300/4160 volts – 13000 PIV 6900 volts – 19500 PIV		
Thermal Capacity	600% of FLA, 10 seconds 450% of FLA, 30 seconds			
dv/dt Protection	R.C. Snubber Network			
Maximum Heat Dissipation (kW)	Start or Stop Cycle (@ 450% FLA)			Continuous
		180 A	360 A	600 A	
	0 to 2400 V	7	13	22	.25
	2401 to 5000 V	14	26	44	.25
	5001 to 7200 V	21	39	66	.25
Net Shipping Weight (3 phases)	Rating	1000 / 2300 V	3300 / 4160 V	6900 V	
	180A / 360A	105 kg (231 lb)	113 kg (249 lb)	126 kg (278 lb)	
	600 A	132 kg (290 lb)	154 kg (339 lb)	170 kg (374 lb)	

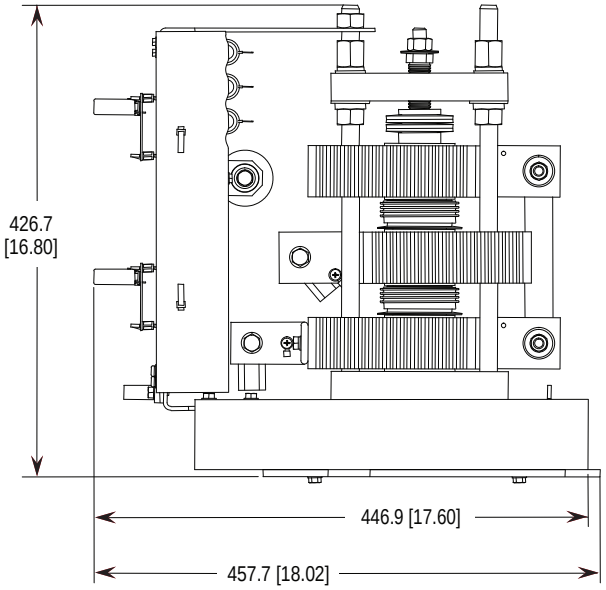
❶ 180A and 360A ratings only for 1000 V power stack

Power Stack (cont.)

• 1000/2300 V, 180/360 A

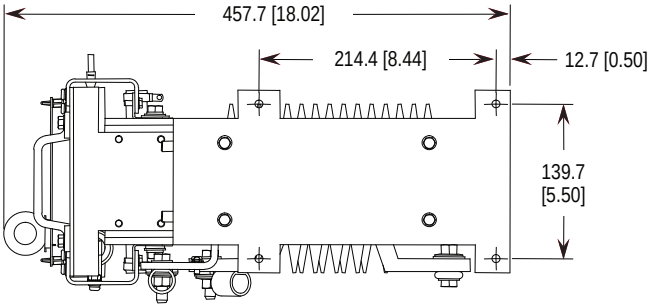


Front View



Side View

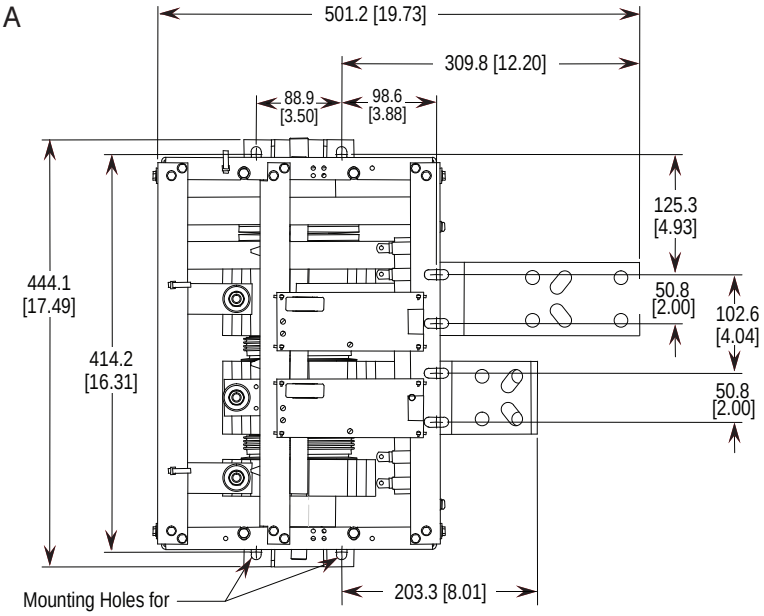
Note: All dimensions include mounting bracket.



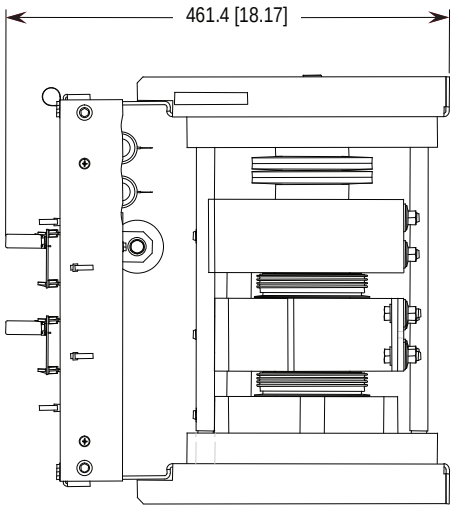
Bottom View

Dimensions in millimeters [inches]

• 2300 V, 600 A

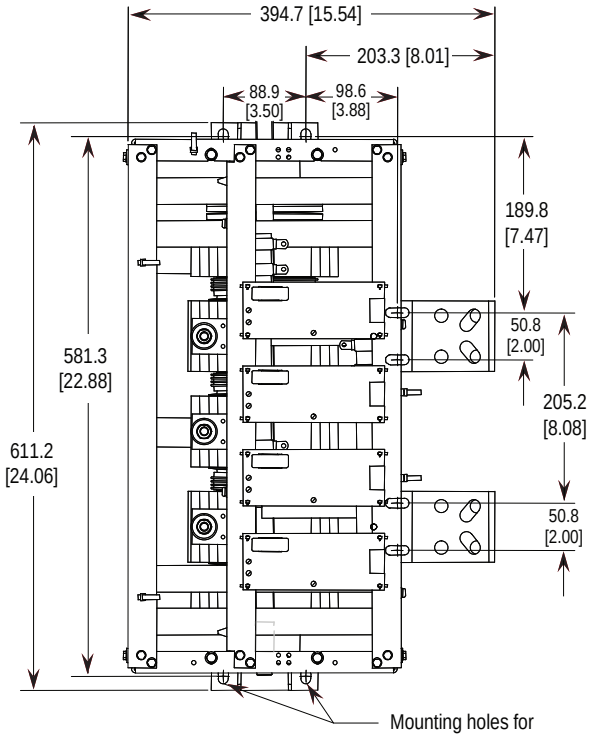


Front View

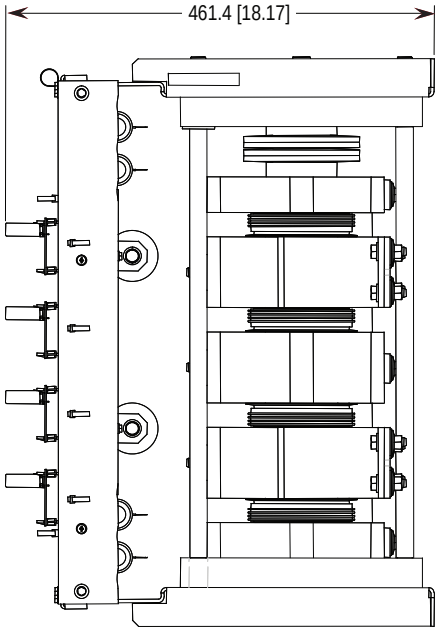


Side View

• 3300/4160 V, 600 A



Front View



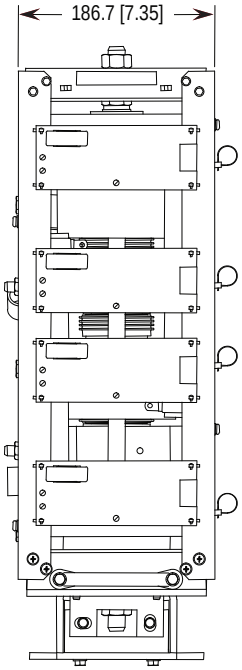
Side View

Dimensions in mm [inches]

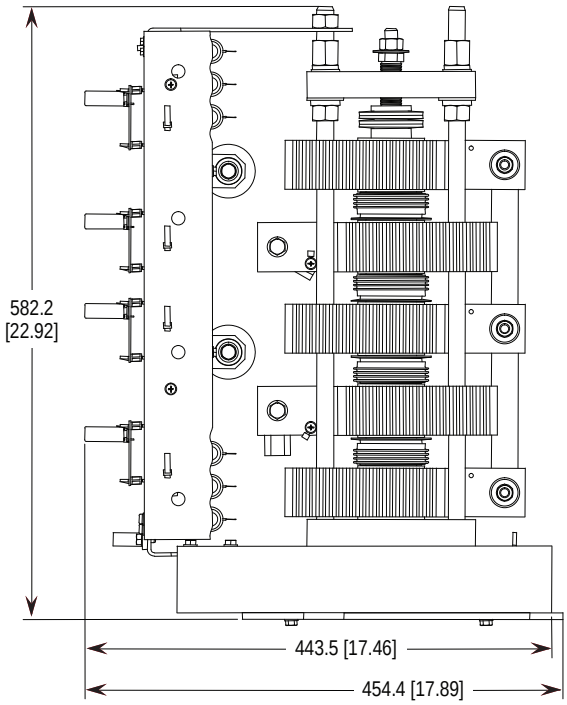
MV SMC FLEX OEM KITS – SMC™ FLEX POWER STACKS

Power Stack (cont.)

• 3300/4160 V, 180/360 A

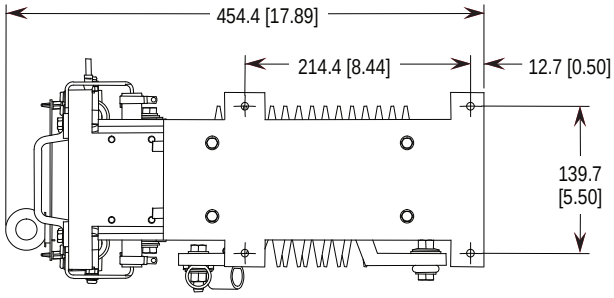


Front View



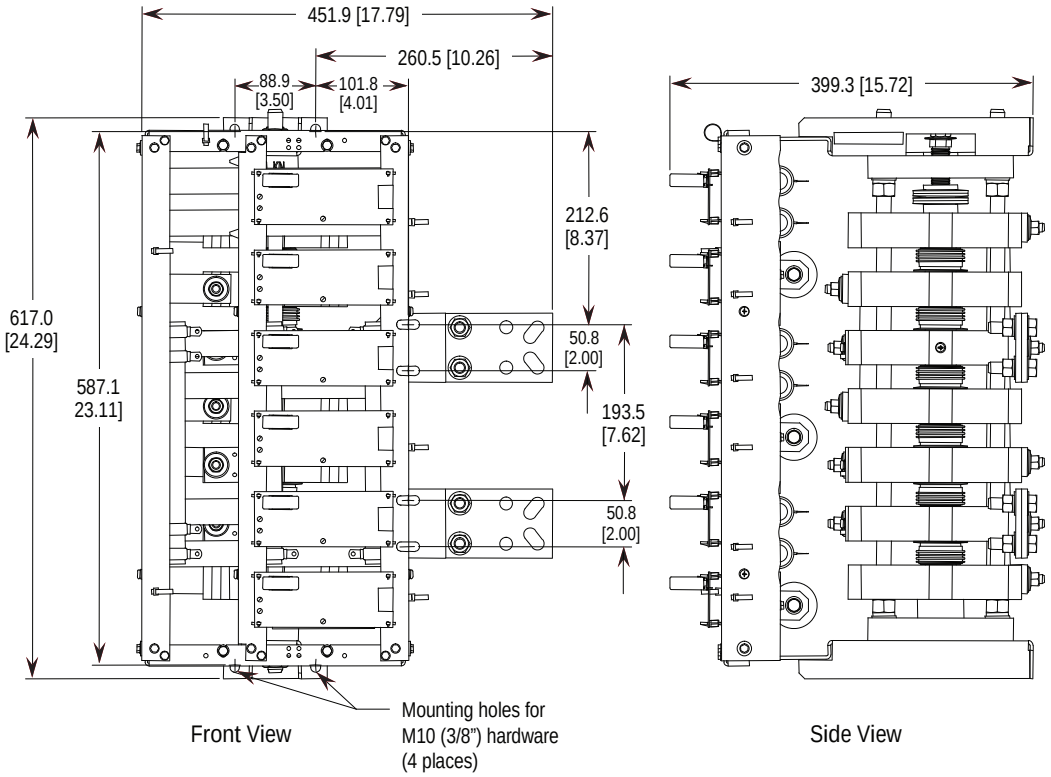
Side View

Note: All dimensions include mounting bracket.

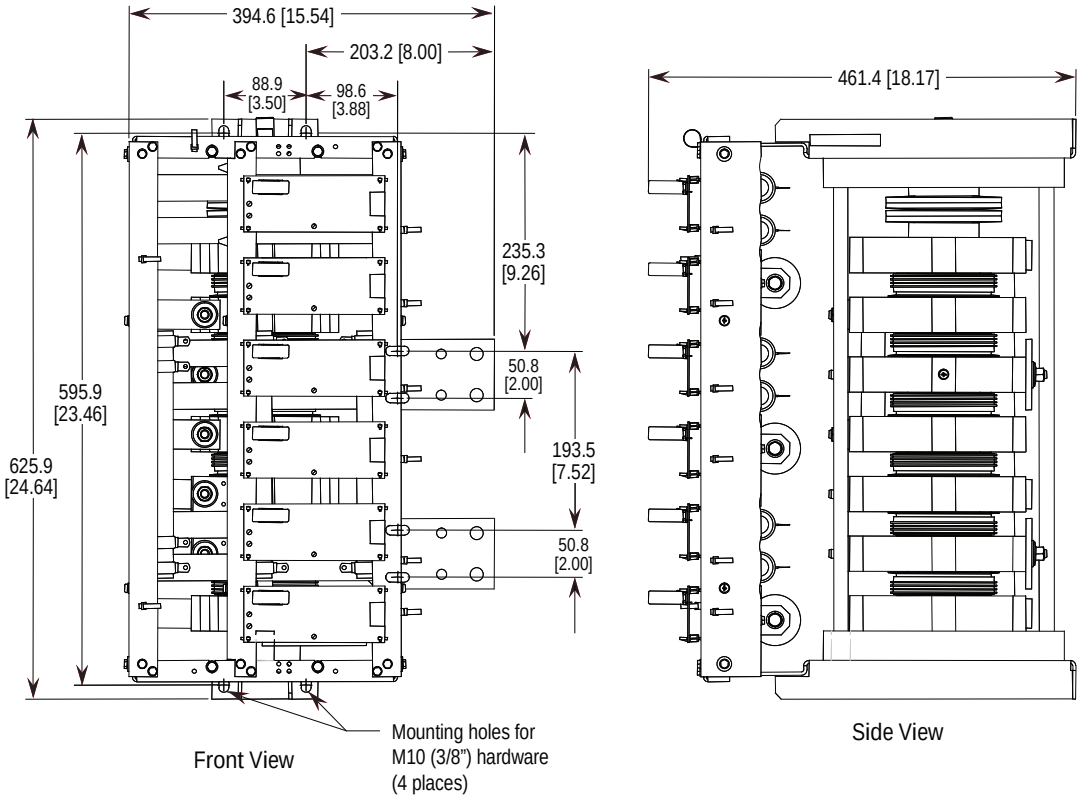


Bottom View

• 6900 V, 180/360A



• 6900 V, 600 A



Dimensions in mm [inches]

Power Stack Options and Catalog Numbers

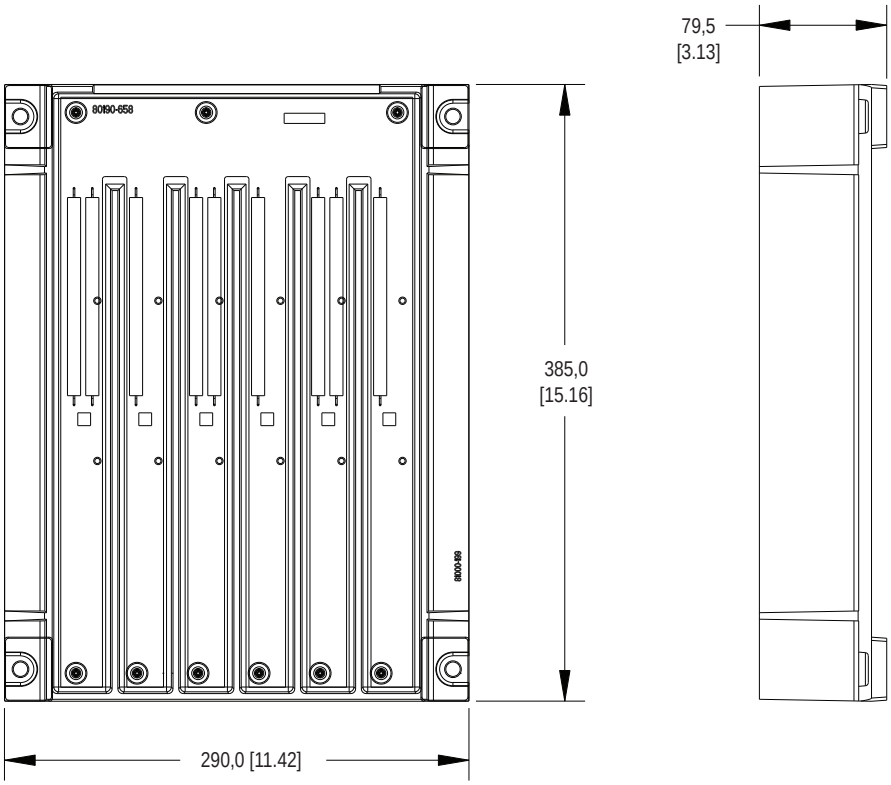
Voltage ❶	Current (Amps)	Catalog Number
1000 V, 3 phase, 50/60 Hz	180	1503E-PPZ1T
	360	1503E-PPZ1A
2300 V, 3 phase, 50/60 Hz	180	1503E-PPAT
	360	1503E-PPAA
	600	1503E-PPAC
3300 V, 3 phase, 50/60 Hz	180	1503E-PPCT
	360	1503E-PPCA
	600	1503E-PPCC
4160 V, 3 phase, 50/60 Hz	180	1503E-PPET
	360	1503E-PPEA
	600	1503E-PPEC
6900 V, 3 phase, 50/60 Hz	180	1503E-PPKT
	360	1503E-PPKA
	600	1503E-PPKC

❶ Voltage ranges : 1000 = 800 to 1449V
2300 = 1450 to 2499V
3300/4160 = 2500 to 4799V
6900 = 4800 to 7200 V

Voltage Sensing Board

Description

The Voltage Sensing Board steps the voltage down from the system voltage to a voltage level compatible with the SMC Flex control module. Includes mounting instructions.



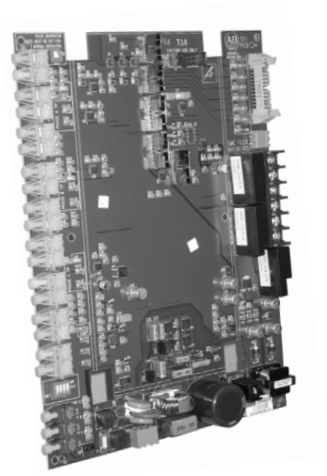
Approximate dimensions in mm [inches]

Catalog Numbers

Description	Line Voltage (3 phase, 50/60 Hz)	Catalog Number
Voltage Sensing Board	800 to 1500	1503E-VSZ1
	1501 to 2,500	1503E-VSA
	2,501 to 4,800	1503E-VSE
	4,801 to 7,200	1503E-VSK

MV SMC FLEX OEM KITS – SMC™ FLEX INTERFACE BOARD

Interface Board



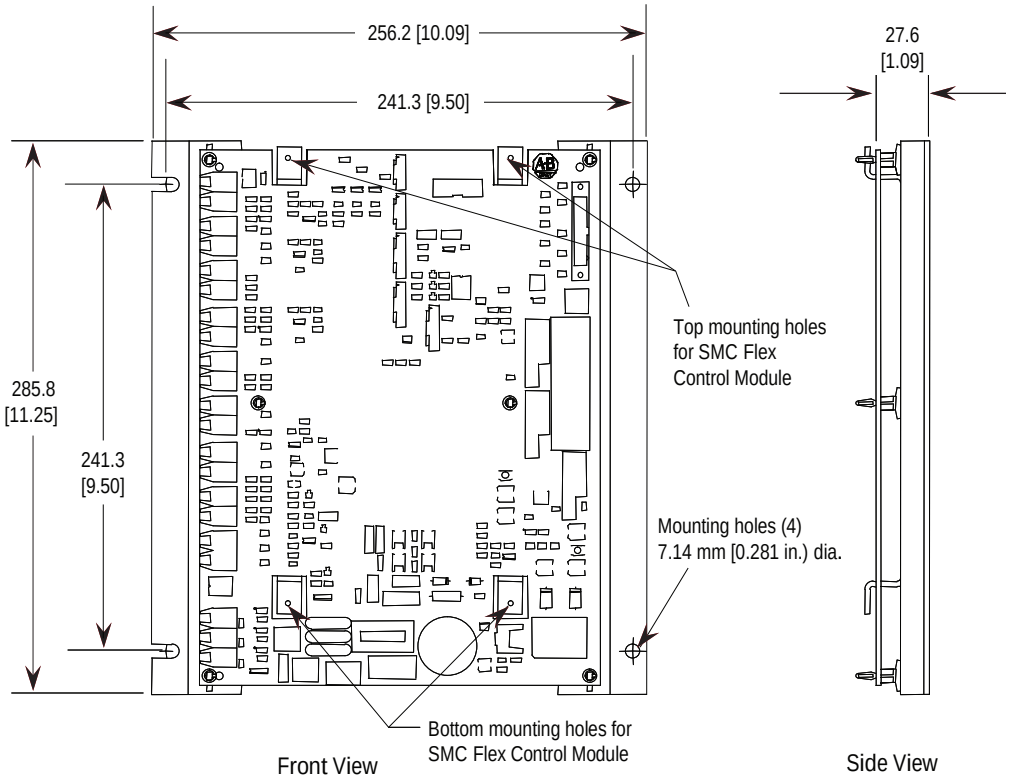
Description

Converts digital signals from the SMC Flex control module to drive the gate driver boards via fiber optics. It also provides voltage, current and temperature feedback to the control module. Includes mounting instructions.

Specifications

Control Voltage	110/120 to 220/240 V – 50/60 Hz, 15 VA
Gate Drive	Via Fiber Optics
SCR Overtemperature	Via Fiber Optics

Interface Board and Mounting Brackets



Approximate dimensions in mm [inches]

Note: Dimensions shown include mounting bracket assembly which is included with the interface board.

Catalog Number

Interface Board	Catalog Number
110/120 to 220/240 V AC – 50/60 Hz	1503E-INTB

SMC Flex Control Module

Description

The SMC Flex control module provides microprocessor controlled starting for standard three-phase, squirrel-cage induction motors. The SMC Flex control module provides the following modes of operation as standard:

- Soft Start – with selectable kickstart
- Soft Stop
- Current Limit Start – with selectable kickstart
- Linear Acceleration* – with selectable kickstart
- Linear Deceleration*
- Dual Ramp – with selectable kickstart
- Full Voltage
- Preset Slow Speed

* requires motor tachometer

The SMC Flex control module provides motor protection, including overload, underload, stall, jam, etc., during starting and while the bypass contactor is energized.

Starting and Stopping Options

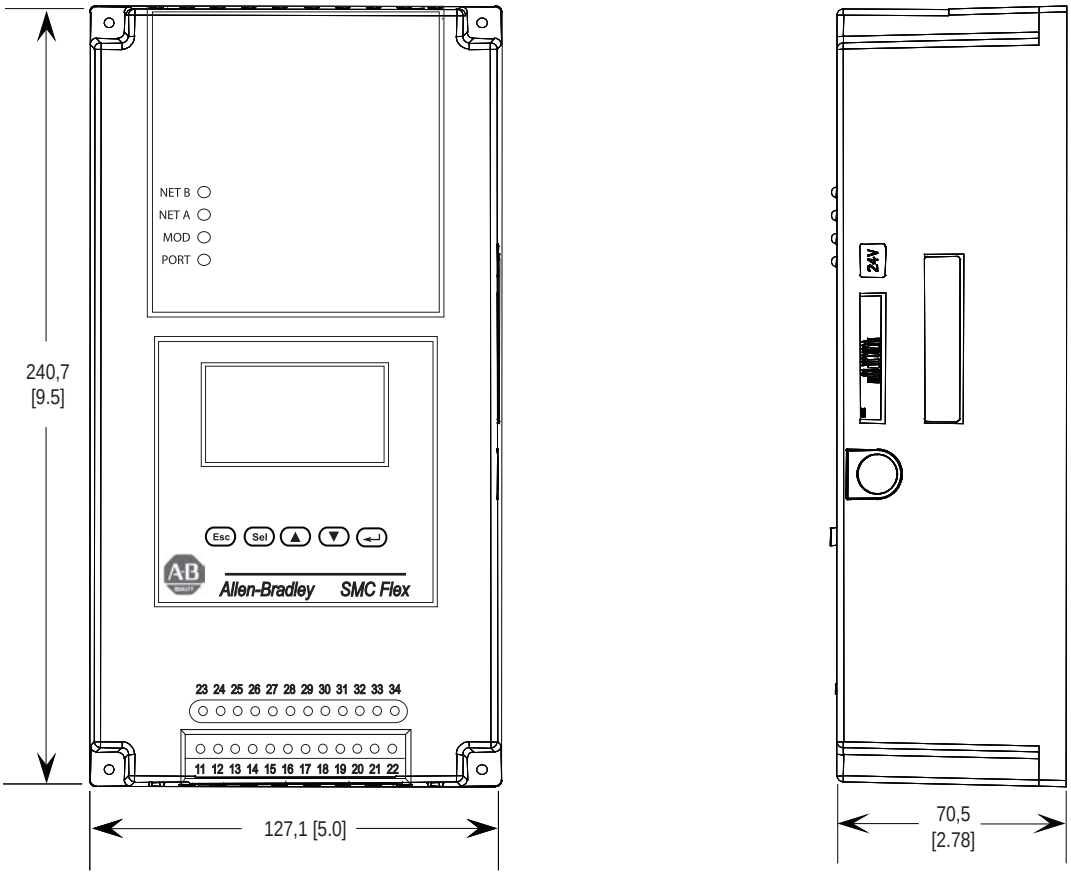
The following option is available in the MV SMC Flex controller:

- Pump Control

Specifications

Electrical Ratings		UL/CSA/NEMA	IEC
Control Circuit	Rated Operational Voltage	100 to 240 VAC	100 to 240 V ~
	Rated Insulation Voltage	NA	240 V ~
	Rated Impulse Voltage	NA	3000 V
	Dielectric Withstand	1600 VAC	2000 V ~
	Operating Frequency	50/60 Hz	50/60 Hz
	Protection Against Electric Shock	Finger safe	IP20
Power Requirement	Control Module	75 VA	
Auxiliary Contacts (Relay Contacts)	Rated Operational Voltage	240 VAC	
	Number of contacts (N.O.)	1	
	Rated Current	3A @ 120 VAC, 1.5A @ 240 VAC	
	Operating Frequency	50/60 Hz	
	Utilization Frequency	AC-15	
	Make/Break VA	3600/360	
Environmental		UL/CSA/NEMA	IEC
Operating Temperature Range (Enclosed)		0°C to 40°C (32°F to 104°F)	
Storage and Transportation Temperature Range		-20°C to 75°C (-4°F to 167°F)	
Altitude		2000 meters (6,500 ft.)	
Humidity		5% to 95% (non-condensing)	
Pollution Degree		2	

SMC Flex Control Module (cont.)



Front View

Side View

Approximate dimensions in mm {inches]

Options and Catalog Numbers

Control Module Options	Catalog Number
Standard Module	1503E-S1FX
Pump Control	1503E-B1FX

Fiber Optics

Description

Fiber optic cables connect the interface board to gate driver boards mounted on power stacks. They are also used to connect thermistors in the power stacks to interface boards. Two lengths are available to aid the design and manufacture of a new controller, or to retrofit into an existing enclosure. Includes mounting instructions.

Specifications

Voltage Range	No. of Cables	
	2.5 m (8.2 ft)	5.0 m (16.4 ft)
800 to 1500 V	9	9
2400 V	9	9
3300 V	15	15
4160 V	15	15
6100 V	21	21

Options and Catalog Numbers

Length of Cable	Fiber Optics Options	Catalog Number
2.5 m (8.2 ft)	800 to 2300 V	1503E-25FO6
	3300 to 4160 V	1503E-25FO12
	6900 V	1503E-25FO18
5.0 m (16.4 ft)	800 to 2300 V	1503E-50FO6
	3300 to 4160 V	1503E-50FO12
	6900 V	1503E-50FO18

MV SMC FLEX OEM KITS – SMC™ FLEX GATE DRIVER TEST POWER SUPPLY

Gate Driver Test Power Supply

Description

The test power supply is used to provide power for the gate driver board during commissioning and/or troubleshooting. Includes operating instructions.

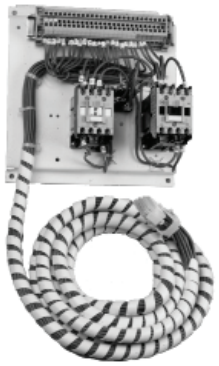
Specifications

Voltage Range	120 V AC – 60 Hz	110/220 V AC – 50/60 Hz
AC Power Cord	North American (Cord supplied)	Universal (Cord supplied by OEM)

Options and Catalog Numbers

Test Power Supply Options	Catalog Number
120 V AC, 60 Hz	1503E-PSD
Universal (requires power cord)	1503E-PSU

Relay Control Panel

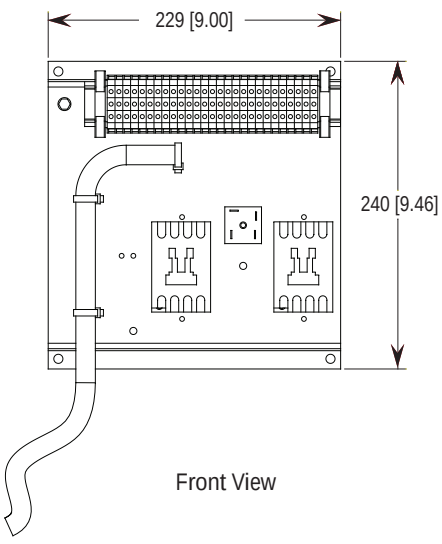


Description

The control panel is available for maximum flexibility. It connects to the Bulletin 1502 vacuum bypass contactor, and the SMC Flex control module. It lets the SMC Flex control module close the contactor once the motor is up-to-speed, and open the contactor under stop control. It is also used to control contactors in a multiple contactor application (autotransformers, reactor starters, etc.) The control panel connects the auxiliary contact on the contactor directly to the terminal blocks.

Specifications

Description	Specification	
Control	110/120 V AC, 50/60 Hz	220/240 V AC, 50/60 Hz
Cable	3.05 m (10 ft)	3.05 m (10 ft)
Terminal Blocks	Qty 27, 1492-W4	Qty 27, 1492-W4
Wire Gauge	#14 AWG	#14 AWG



Approximate dimensions in millimeters [inches]

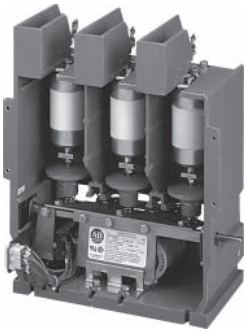
Options and Catalog Numbers

Control Panel Options	Catalog Number
Electrically held, 110/120 V AC, 50/60 Hz – 400 A	1503E-CE4D
Electrically held, 220/240 V AC, 50/60 Hz – 400 A	1503E-CE4E
Electrically held, 110/120 V AC, 50/60 Hz – 800 A	1503E-CE8D
Electrically held, 220/240 V AC, 50/60 Hz – 800 A	1503E-CE8E

The IntelliVAC controller is offered as a substitute for electro-mechanical control circuits, with numerous additional benefits. OEMs have a more flexible means of unit control that results in reduced overall panel space and enhanced control functionality.

MV SMC FLEX OEM KITS – SMC™ FLEX BYPASS CONTACTOR

Bypass Contactor



400 A

Description

Bulletin 1502 contactors are available for use as bypass contactors. They are required to bypass or short out the SCRs once the motor is up to speed. The SMC Flex control module will control the closing of this contactor when the auxiliary contact is programmed for the up-to-speed setting.

Bulletin 1502 contactors (fast dropout only) are used with the 800 to 6900 V AC frames and power poles. Select the appropriate current, line voltage and control voltage to suit your application.

Note: The SCRs must be bypassed once up to speed. They are not rated for continuous duty. Failure to bypass the SCRs will result in component failure.

Specifications

Refer to Bulletin 1502 description on page 1, and Specifications on page 2.

Selection

Refer to Bulletin 1502 selection table on page 7.

Options and Catalog Numbers

Description	Catalog Number	Communication Option
1A/5A CT input, 1A/5A Earth Fault CT input, 40-265V AC/DC voltage supply	857-3C6AAD	RS485 ❶
	857-3C6AAL	Ethernet/Ethernet IP
	857-3C6AAM	IEC 61850
1A/5A CT input, 1A/5A Earth Fault CT input, 40-265V AC/DC voltage supply c/w RTD interface	857-3C6AND	RS485 ❶
	857-3C6ANL	Ethernet/Ethernet IP
	857-3C6ANM	IEC 61850
1A/5A CT input, 1A/5A Earth Fault CT input, 40-265V AC/DC voltage supply c/w a glass fiber RTD interface for use with 857-RAD	857-3C6AED	RS485 ❶
	857-3C6AEL	Ethernet/Ethernet IP
	857-3C6AEM	IEC 61850

❶ Supports Modbus

Refer to the following publications for more technical information:

– 857 Protection System for Feeder and Motor Protection • User Manual (857-UM001_-EN-P)
– 857 Protection System for Feeder and Motor Protection • Spec. Guide (857-SR001_-EN-P)
– SetPointPS Configuration Software • Programming Manual (857-PM001_-EN-P)

Accessories for Bulletin 857

Accessories

Description	Catalog Number
12-channel RTD Input module (single fiber) ❶	857-RAA
12-channel RTD Input module (dual fiber) ❷ c/w 4 x 4-20 mA Input/Outputs	857-RAD
Programming cable for SetPoint PS	857-VX003-3
3-meter Fiber optic cable ❸	80026-385-03

❶ One fiber optic cable required separately.
❷ Two fiber optic cables required separately.
❸ Longer fiber optic cables can be ordered.

BULLETIN 865 DIFFERENTIAL PROTECTION RELAY

Options and Catalog Numbers

Description	Catalog Number	Communication Option
5A/5A Nominal current, 5A/5A Earth Fault CT input, 40-265V AC/DC voltage supply	865-5A7ADE	RS485 ❶
	865-5A7AHE	Ethernet/Ethernet IP
	865-5A7AKE	IEC 61850

❶ Supports Modbus

Accessories for Bulletin 865

Accessories

Description	Catalog Number
Programming cable for SetPoint PS	857-VX003-3

Full Load Currents of 3 Phase, 60 Hertz, Medium Voltage AC Induction Motors

This table is FOR REFERENCE ONLY. The full load currents listed below are "average values" for horsepower/kW rated motors. These "average values," along with the similar values listed in NEC/CEC, should be used only as a guide for selecting appropriate components for the Motor Branch Circuit. The rated full load current, shown on the motor nameplate, may vary considerably from the list value depending on the specific motor design.

IMPORTANT: The motor nameplate full load current should always be used in determining the rating of the devices used for Motor Running Overcurrent Protection.

kW Rating	Horsepower Rating	Full Load Current at 1800 RPM (Amperes)							
		2300V	3300V	4000V	4600V	6000V	6300V	6600V	6900V
75	100	23	16	13	11	9	8	8	8
93	125	29	20	16	14	11	10	10	10
112	150	34	24	20	17	13	13	12	11
131	175	40	28	23	20	15	15	14	13
150	200	46	32	26	23	18	17	16	15
168	225	52	36	30	26	20	19	18	17
187	250	57	40	33	29	22	21	20	19
224	300	68	48	39	34	26	25	24	23
261	350	80	56	46	40	31	29	28	27
298	400	91	64	52	46	35	33	32	30
336	450	103	72	59	51	39	38	36	34
373	500	113	79	65	57	43	41	39	38
448	600	134	94	77	67	52	49	47	45
522	700	158	110	91	79	60	58	55	53
560	750	169	118	97	85	65	62	59	56
597	800	177	124	102	89	68	65	62	59
671	900	202	141	116	101	77	74	70	67
746	1000	216	151	124	108	83	79	75	72
932	1250	273	190	157	137	105	100	95	91
1120	1500	326	227	188	163	125	119	114	109
1305	1750	376	262	216	188	144	137	131	125
1492	2000	434	303	250	217	166	159	151	145
1679	2250	485	338	279	242	186	177	169	162
1865	2500	537	375	309	269	206	196	187	179
2052	2750	591	412	340	296	227	216	206	197
2238	3000	647	451	372	324	248	236	226	216
2611	3500	750	523	431	375	288	274	261	250
2984	4000	857	597	493	429	329	313	299	286
3357	4500	964	672	554	482	370	352	336	321
3730	5000	1071	747	616	536	411	391	373	357
4103	5500	1179	821	678	589	452	430	411	393
4476	6000	1286	896	739	643	493	469	448	429
5222	7000	1500	1046	863	750	575	548	523	500
5968	8000	1714	1195	986	857	657	626	597	571
6714	9000	1929	1344	1109	964	739	704	672	643
7460	10000	2143	1494	1232	1071	821	782	747	714

Altitude Code/Derating Table

Altitude Derating	Altitude Code (Add to Catalog Number)	Contactor Return Spring Plating Color (400 A only)	Reduce Max. Continuous Current Rating by :				Reduce B.I.L. Withstand Rating by:
			180 A	400 A	600 A	800 A	
0 to 1,000 m (0 to 3,300 ft)	1	Bronze-chromate	—	—	—	—	—
1,001 to 2,000 m (3,301 to 6,600 ft)	2	Green	5 A	10 A	15 A	20 A	6.0 kV
2,001 to 3,000 m (6,601 to 9,900 ft)	3	Blue	10 A	20 A	30 A	40 A	12.0 kV
3,001 to 4,000 m (9,901 to 13,200 ft)	4	Black	15 A	30 A	45 A	60 A	18.0 kV
4,001 to 5,000 m (13,201 to 16,500 ft)	5	Olive	20 A	40 A	60 A	80 A	24.0 kV

Appendix C

Voltage Ranges ❶

Nominal Line Voltage	Voltage Range
1000 V	800 to 1449 V
2400 V	1450 to 2499 V
3300 / 4160 V	2500 to 4799 V
5500 / 6900 V	4800 to 7200 V

❶ For voltage ranges other than those listed, contact Rockwell Automation – see back cover.

www.rockwellautomation.com

Power, Control and Information Solutions Headquarters

Americas: Rockwell Automation, 1201 South Second Street, Milwaukee, WI 53204-2496 USA, Tel: (1) 414.382.2000, Fax: (1) 414.382.4444
Europe/Middle East/Africa: Rockwell Automation NV, Pegasus Park, De Kleetlaan 12a, 1831 Diegem, Belgium, Tel: (32) 2 663 0600, Fax: (32) 2 663 0640
Asia Pacific: Rockwell Automation, Level 14, Core F, Cyberport 3, 100 Cyberport Road, Hong Kong, Tel: (852) 2887 4788, Fax: (852) 2508 1846

Medium Voltage Products, 135 Dundas Street, Cambridge, ON, N1R 5X1 Canada, Tel: (1) 519.740.4100, Fax: (1) 519.623.8930, www.ab.com/mvb

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